

The Tinthiinae of North Vietnam (Lepidoptera, Sesiidae)*

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Abstract In the present paper the Tinthiinae fauna of Vietnam is reviewed. 21 species, placed in 10 genera, are mentioned; 12 species and one genus are described as new to science. *Ceratocorema hyalina* sp. nov., *C. yoshiyasui* sp. nov., *Paranthrenopsis flaviventris* sp. nov., *Caudicornia tonkinensis* sp. nov., *Entrichella tricolor* sp. nov., *Trichocerota melli* sp. nov., *Paradoxecia tristis* sp. nov., *P. luteocincta* sp. nov., *P. karubei* sp. nov., and *Rectala magnifica* sp. nov. are described in the tribe Tinthiini; *Caudicornia xanthopimpla* Bryk, 1947, *Entrichella pogonias* Bryk, 1947, *Trichocerota radians* Hampson, 1919, *T. proxima* Le Cerf, 1916, comb. rev., *Paradoxecia dizona* (Hampson, 1919), comb. nov., and *P. myrmekomorpha* (Bryk, 1947), comb. nov. are firstly recorded for the fauna of Vietnam. The genus *Corematosetia* gen. nov., with its type species *Corematosetia naumanni* sp. nov., is described in the tribe Pennisetiini; one species, *Similipepsis helicellus* sp. nov., is described in Similipepsini. Additionally, the following new generic synonyms are provided: *Ceratocorema* Hampson, 1893, stat. rev. (= *Neotinthia* Hampson, 1919, syn. nov.), *Paranthrenopsis* Le Cerf, 1911 (= *Oligophlebiella* Strand, 1916, syn. nov.), and *Paradoxecia* Hampson, 1919 (= *Paranthrenina* Bryk, 1947, syn. nov.). The genus *Tyriactaca* Walker, 1862 is placed in Tinthiinae. The monophyly of the subfamily is discussed.

Key words Tinthiinae, Sesiidae, phylogeny, Vietnam, Oriental region, *Ceratocorema* (= *Neotinthia* syn. nov.), *Paranthrenopsis* (= *Oligophlebiella* syn. nov.), *Entrichella*, *Trichocerota*, *Paradoxecia* (= *Paranthrenina* syn. nov.), *Rectala*, *Corematosetia* gen. nov., *Similipepsis*, new species.

Introduction

During the past 10 years the exploration of the Lepidoptera fauna of Vietnam has been the aim of several field expeditions. An extensive and scientifically highly important material, especially in Heterocera has been collected. Naturally the number of clearwing moths (Sesiidae) sampled was comparably small. However, Japanese entomologists especially have focused on this interesting family. Mainly with the use of artificial pheromone lures, clearwing moths have been collected. In about the same period of time, the first papers exclusively dealing with Vietnam Sesiidae were published (Gorbunov, 1988; Gorbunov & Arita, 1995a, 1995b, 1995c, 1996, 1997), mainly based on material from the Geneve Museum, collected by Romieux in 1950. Very recently, systematic work was started on the Sesiidae fauna of Vietnam. Papers on the clearwing moths of the tribes Melittiini, Osminiini, and Synanthedonini from Vietnam were recently published (Arita & Gorbunov, 2000a, 2000b, 2000c; Arita & Kallies, 2000; Gorbunov & Arita, 2000a).

Within the present work the authors review the clearwing moths of the subfamily Tinthiinae known from North Vietnam. A total of 10 genera with 21 species are mentioned here; one

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genus and 12 species are described as new to science. This is a remarkably high number of species, especially taking into consideration, that only three localities (Cuc Phuong National Park, Mt Tam Dao, and Sa Pa) have been sampled regularly. The total number of Tinthiinae species known from northern Vietnam is even higher but several species remain unnamed due to the poor condition of the material at hand. Additionally, many species undoubtedly yet remain to be discovered. As in other groups of Lepidoptera, also in Tinthiinae close affinities to the fauna of north-eastern India and southern China are observed. *Paradoxecia dizona* (Hampson, 1919), comb. nov., *Trichocerota radians* Hampson, 1919, and *T. proxima* Le Cerf, 1916, were described from north-eastern India and are here recorded for northern Vietnam from the first time. Other species, like *Caudicornia tonkinensis* sp. nov., *Entrichella pogonias* Bryk, 1947, and *Trichocerota melli* sp. nov., occur in southern China, as well.

Subfamily Tinthiinae Le Cerf, 1917

The Tinthiinae are one of the two established subfamilies of clearwing moths (Sesiidae). Within the group three tribes are currently recognized, the Tinthiini, Pennisetiini, and Similipepsini. The subfamily is well defined by a number of characters distinguishing it from Sesiinae which represent the major fraction of the Sesiidae. Unlike the Sesiinae which have clavate antennae with an apical pencil of setae, the antennae of Tinthiinae are simple filiform, bipectinate or ciliate, but never clavate, and lack the apical setae. The venation shows a tendency of reduction of vein Cu_2 of the forewing, and a loss of A_3 of the hindwing while A_1 is always retained. The male genitalia are simple (valva without processes, with simple hair-like setae on the inner surface; gnathos usually absent or strongly reduced; vinculum without posterior processes, often without or strongly reduced saccus). The coecum penis, the proximal extension of the aedaeagus, which is present in many Tinthiinae species, is unknown in Sesiinae. The subfamily is thought to represent the more primitive group of Sesiidae, characterized mainly by the lack of apomorphic characters which are present in Sesiinae (Naumann, 1971; Eichlin, 1986). However, Minet (1986) argued that the polarity of certain traits which have been considered to be of a plesiomorphic state should be reversed referring to the conditions in Castniidae (Sesioidea) (also comp. to Edwards *et al.*, 1999). This view is supported by the finding that gnathos and saccus, respectively, are present in certain genera of Tinthiinae (*Rectala* Bryk, 1947, *Oligophlebia* Hampson, 1893) suggesting that the absence of these characters in most of the Tinthiinae is due to secondary reduction. A character, which was not mentioned by other authors is a specific resting behavior of the adult Tinthiinae moths. Species of the genera *Entrichella* Bryk, 1947, *Microsphecia* Bartel, 1912, and *Paranthrenopsis* Le Cerf, 1916, but also of *Oligophlebia*, and *Pennisetia* Dehne, 1850, have been observed resting with the middle pair of legs spread out and erect above the dorsal side of the thorax (Fig. 1). This highly specialized habit has never been seen in species of Sesiinae, or any other Sesioidea species, and is treated as clearly autapomorphic here. In our opinion, this character strongly indicates the presence of a monophyletic group formed by the species of the subfamily Tinthiinae.

Like the entire family of Sesiidae, the subfamily Tinthiinae is present in all zoogeographic regions. Beside the Neotropics, it is especially diverse and rich in species in the Oriental region. However, the Tinthiinae fauna of the latter has never been reviewed systematically. The present paper is an attempt to examine the fauna of Tinthiinae regarding Vietnam, with a special reference to North Vietnam, an area which is comparably well investigated within the Oriental region.



Fig. 1. Resting Tinithiinae, *Paranthrenopsis editha* (Butler, 1878), with middle pair of legs erected (Japan, Honshu, Mt Hyonosen, VIII. 1991).

Checklist of the Tinithiinae of Vietnam

Tinithiini Le Cerf, 1917

Ceratocorema Hampson, 1893, gen. rev.

= *Neotinthia* Hampson, 1919, syn. nov.

C. hyalina sp. nov.

C. yoshiyasui sp. nov.

Paranthrenopsis Le Cerf, 1911

= *Oligophlebiella* Strand, 1916, syn. nov.

P. flaviventris sp. nov.

Caudicornia Bryk, 1947

C. xanthopimpla Bryk, 1947

C. tonkinensis sp. nov.

Enrichella Bryk, 1947

E. pogonias Bryk, 1947

E. tricolor sp. nov.

Trichocerota Hampson, 1893

T. proxima Le Cerf, 1916, comb. rev.

T. radians Hampson, 1919

T. spilogastra (Le Cerf, 1916), comb. rev.

T. melli sp. nov.

Paradoxecia Hampson, 1919

= *Paranthrenina* Bryk, 1947, syn. nov.

P. myrmekomorpha (Bryk, 1947), comb. nov.

P. vietnamica Gorbunov & Arita, 1997

P. luteocincta sp. nov.

P. karubei sp. nov.

P. dizona (Hampson, 1919), comb. nov.

P. tristis sp. nov.

Rectala Bryk, 1947

R. magnifica sp. nov.

Pennisetiini Naumann, 1971

Corematosetia gen. nov.

Corematosetia naumanni sp. nov.Similipepsini Spatenka *et al.*, 1993*Similipepsis* Le Cerf, 1911= *Vespaegeria* Strand, 1913*S. helicellus* sp. nov.*Milisipepsis* Gorbunov & Arita, 1995*M. bicingulata* (Gorbunov & Arita, 1995)

Material mentioned in this paper is deposited in the following collections: the Natural History Museum, London, England (BMNH); Museum für Naturkunde, Zentralinstitut der Humboldt-Universität, Berlin, Germany (MNHB); Museum für Naturkunde Karlsruhe, Germany (MNK); Zoological Laboratory, Faculty of Agriculture, Meijo University, Nagoya, Japan (ZMUN); Department of Zoology, National Science Museum, Tokyo, Japan (NSMT); Museum national d'Histoire naturelle, Paris, France (MNHP); Muséum d'Histoire Naturelle Genève, Switzerland (MHNG); Collection Masumi Ikeda, Tokyo, Japan (CMI); Collection Axel Kallies, Berlin, Germany (CAK); Collection Hans Riefenstahl, Hamburg, Germany (CHR).

The following abbreviations have been used: ETA—External Transparent Area of forewing; ATA—Anterior Transparent Area of forewing; PTA—Posterior Transparent Area of forewing.

Tribe Tinthiini Le Cerf, 1917***Ceratocorema* Hampson, gen. rev.**

Ceratocorema Hampson, 1893: 188 (key), 200. Type species: *Ceratocorema postcristatum* Hampson, 1893, by monotypy. Hampson, 1919: 115 (as a synonym of *Tinthia* Walker, 1865); Dalla Torre & Strand, 1925: 183 (as a synonym of *Tinthia*); Gaede, 1933: 798 (as a synonym of *Tinthia*); Naumann, 1971: 13; Heppner & Duckworth, 1981: 21 (as a synonym of *Tinthia*); Fletcher & Nye, 1982: 33.

Neotinthia Hampson, 1919: 51 (key), 115. Type species: *Neotinthia semihyalina* Hampson, 1919, by monotypy. Dalla Torre & Strand, 1925: 180; Gaede, 1933: 797; Naumann, 1971: 21; Heppner & Duckworth, 1981: 22; Fletcher & Nye, 1982: 108; Robinson *et al.*, 1994: 106. **Syn. nov.**

The genus *Ceratocorema* gen. rev. was described by Hampson (1893) to include a small Tinthiinae species with brownish semi-transparent forewings (*C. postcristatum* Hampson, 1893). Later, he treated this genus as a synonym of *Tinthia* Walker, 1864 (type species *T. varipes* Walker, 1865) but established the genus *Neotinthia* for a similar species with well developed transparent areas (*N. semihyalina* Hampson, 1919). However, studying the species of these two groups from Vietnam and other areas, no basic morphological differences were found between species with well developed transparent areas and those with semi-transparent wings, but all were found to be distinctly different from *Tinthia*. They differ clearly by a number of autapomorphic characters, given below.

Diagnosis. Small Tinthiinae moths (11–20 mm). Body smooth-scaled; proboscis well developed; antenna filiform, very short-scaled, in ♂ long ciliate; abdomen short and dorso-ventrally flattened; forewing with well developed transparent or semi-transparent areas and a narrow distinct discal spot; area between radius and costal margin densely scaled; legs with tibial spurs long, the latter at least as long as basal tarsomer; mid tibia and basal tarsomer of mid tarsus with long tufted scales along dorsal margin; hind tibia dorsally with two distinct

tufts of long scales in middle part and at distal end; hind tarsus with long tufted scales along dorsal margin of basal tarsomer; tufts of mid and hind legs often brightly colored with an mixture of black, white and yellow or red scales. Clasper plates (comp. to Naumann, 1971) of the 7th tergite of the male abdomen caudally fused.

Male genitalia. Uncus finger-shaped, apically well sclerotized and pointed downwards, sparsely covered with long hair-like setae; inner surface of valva densely clothed with hair-like setae, apex towards ventral margin; aedaeagus relatively short, about 1.8 times as long as valva, coecum penis absent, bulbus ejaculatoris long, distally bag-like enlarged, vesica with distinct areas of dense minute spines; vinculum short; tuba anales large, membranous, slightly sclerotized ventro-basally; tegumen simple; vinculum narrow, short; saccus small, triangular, not pointed.

Female genitalia. Ovipositor long; papilla anales small; posterior apophysis conspicuously longer than anterior pair; 8th tergite relatively broad, with a short, weakly sclerotized dorsal appendix at base of apophysis; ostium small, in intersegmental membrane, close to segment 7; antrum well sclerotized; corpus bursae large, bulbous, membranous, with one or two signa.

The genus *Ceratocorema* can be distinguished from *Tinthia* by the bright orange-yellow anal tuft, which in ♂ extends laterally into long fan-like tufts of scales on each side (simple in the genus compared), by the long upcurved labial palps, which reach about half of the frons (short and more straight in *Tinthia*), by the well developed transparent or semi-transparent areas and the distinct discal spot of the forewing (opaque throughout, with invisible discal spot in the genus compared), the well developed scale tufts of the hind legs (weak in *Tinthia*), and more importantly by the structure of the aedaeagus in male genitalia, which has some comparable large plates of small cornuti and a large helicoidal ductus ejaculatoris in *Ceratocorema* (both absent in *Tinthia*).

Constitution. *C. postcristata* Hampson, 1893, *C. semihyalina* (Hampson, 1919), **comb. nov.**, *C. mesatma* (Meyrick, 1926), **comb. nov.**, *C. cymbalistis* (Meyrick, 1926), **comb. nov.**, and *C. antiphanopa* (Meyrick, 1927), **comb. nov.**, *C. hyalina* sp. nov., and *C. yoshiyasui* sp. nov.

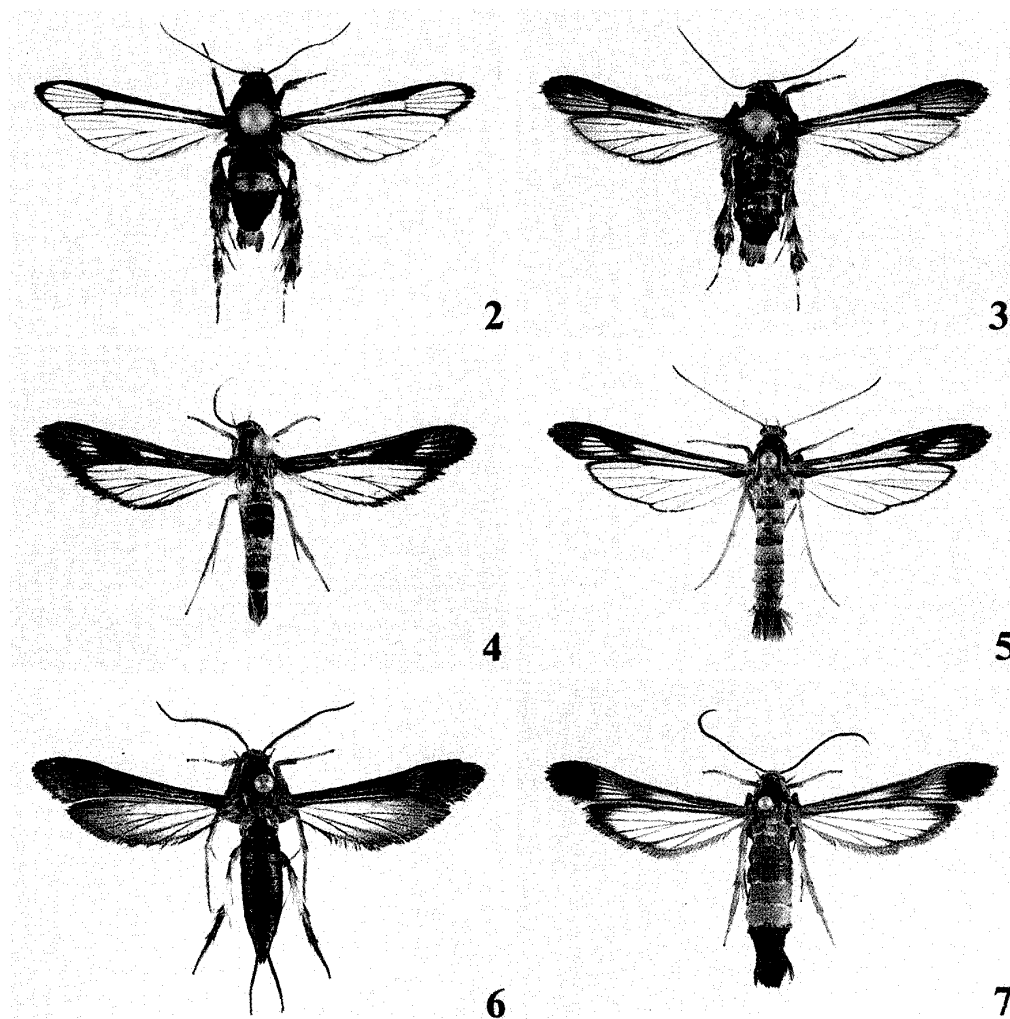
Bionomics. According to Meyrick (1926) and Fletcher (1933) one species (*C. cymbalistis*) was reared from the aerial roots of *Ficus bengalensis* and from swellings on twigs of *Ficus religiosa* (Moraceae). Larvae were found in June and July; pupae in the end of June and once in February. Pupation takes place in a "tough cocoon of silk intermingled with brown frass" (Fletcher, 1933). Adults were collected from April to July.

Distribution. Known from India, Burma, Laos, Vietnam, Malaysia, and Balabac, Philippines (undescribed species).

Remarks. *Ceratocorema* seems to be similar to the genus *Tyriactaca* Walker, 1862 (type species *Tyriactaca apicalis* Walker, 1862), or may represent a junior subjective synonym of it. The genus was placed in "genera unassigned to subfamily" by Heppner & Duckworth (1981). Although the type species of this genus could not been examined yet, following the detailed description in Meyrick (1927), we place *Tyriactaca* in the subfamily Tinthiini.

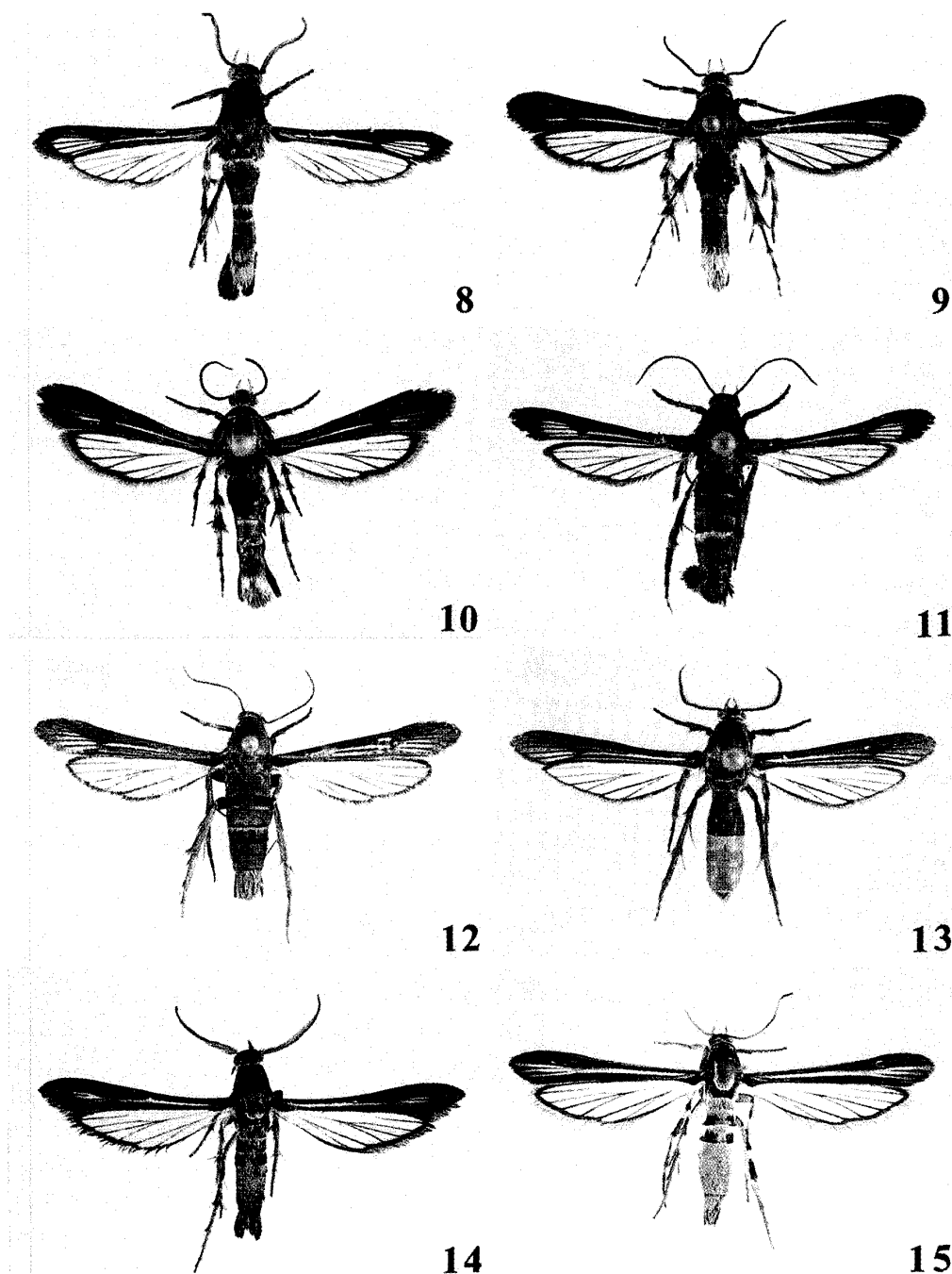
***Ceratocorema hyalina* sp. nov.** (Figs 2, 31, 45)

Description. Holotype ♂ (Fig. 2). Alar expanse 16.5 mm, forewing length 7.5 mm, body length 7.0 mm, antenna 4.8 mm.



Figs 2-8. Tinthiini of Vietnam. 2. *Ceratocorema hyalina* sp. nov., ♂, holotype, alar exp. 16.5 mm (ZMUN). 3. *C. yoshiyasui* sp. nov., ♀, holotype, alar exp. 19.5 mm (ZMUN). 4. *Paranthrenopsis flaviventris* sp. nov., ♀, holotype, alar exp. 24.5 mm (ZMUN). 5. *Caudicornia xanthopimpla* Bryk, 1947, ♂, alar exp. 32 mm (ZMUN). 6-7. *C. tonkinensis* sp. nov. 6. ♂, paratype, alar exp. 28.5 mm (ZMUN). 7. ♀, holotype, alar exp. 40 mm (ZMUN).

Head: antenna filiform, ventrally ciliate; labial palps blackish brown dorsally, silvery white ventrally, apically with yellow scales, apical joint yellow; frons leaden grey, laterally ochre-yellow; vertex black; pericephalic scales black with individual yellow scales dorsally, silvery white ventrally and laterally. Thorax: black, with yellow scales at forewing base; tegulae black, some yellow scales apically; patagia black shining, scattered with individual yellow scales, a yellow patch laterally; metathorax with black hair-like scales, which are white apically. Legs: neck plate white; fore coxa black with yellow in middle part; fore femur black; fore tibia yellow ventrally, black dorsally; basal tarsomer black, remaining tarsomers black, whitish basally; mid leg black; mid femur with narrow white posterior margin and some yellow-red scales at joint to tibia; mid tibial tufts mixed with white and orange-yellow in anterior half dorsally, strongly mixed with yellow orange in middle part and at distal end; mid tarsomers whitish basally; hind leg similar, hind coxa white. Abdomen: black shining, tergite 1 with some hidden yellow scales anteriorly; tergite 2 with dirty-yellow narrow anterior margin laterally and submedially; tergite 7 with a narrow orange-yellow posterior



Figs 8-15. Tinithiini of Vietnam. 8-10. *Entrichella pogonias* Bryk, 1947. 8. ♂, alar exp. 15.5 mm (ZMUN). 9. ♀, alar exp. 24.5 mm (ZMUN). 10. ♀, alar exp. 20 mm (ZMUN). 11-12. *E. tricolor* sp. nov. 11. ♂, paratype, alar exp. 23.5 mm (CHR). 12. ♀, paratype, alar exp. 30 mm (ZMUN). 13. *Trichocerota proxima* Le Cerf, 1916, comb. rev., ♂, alar exp. 25.8 mm (ZMUN). 14-15. *T. radians* Hampson, 1919. 14. ♂, alar exp. 17.5 mm (ZMUN). 15. ♀, alar exp. 25 mm (ZMUN).

margin; anal tuft orange yellow, laterally with two fan-like scale tufts, each orange latero-anteriorly, black apically and interiorly; sternite 1 white; sternite 2 with white spot medially; sternite 3 with a medially broad, laterally narrow, white anterior stripe; sternite 4 black; sternite 5 with some yellow scales medially; sternites 6-7 yellow-white mixed with some black scales. Forewing: transparent areas well developed, discal spot narrow brownish, veins

black, with orange scales basally, apical area very narrow, black; ventral side similar but orange-yellow scales at wing base more extensive. Hindwing: transparent, veins black, discal spot not developed.

Male genitalia (gen. prep. No AK194, Fig. 31). As given in generic diagnosis.

Female (paratype). Somewhat smaller (alar expanse 13.0 mm); otherwise very similar to ♂.

Female genitalia (gen. prep. No AK178, Fig. 45). Antrum narrow and long; corpus bursae with two connected signa.

Diagnosis. *C. hyalina* sp. nov. is somewhat similar to *C. cymbalistis* and *C. semihyalina*. The first differs by the broader and black discal spot of the forewing, the broader junction between costal margin and discal spot, and the brownish abdomen and anal tuft. *C. semihyalina* has the PTA semi-transparent and the discal spot of the forewing black.

Habitat and bionomics. The type specimens were collected in late April and early May; the holotype was taken at the edge of lowland tropical rainforest.

Distribution. Known from two localities in northern Vietnam and Laos only.

Material examined. Holotype ♂, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 26. IV. 1998, Y. Yoshiyasu leg. (ZMUN). Paratype. 1 ♀, Nam Ngum Dam, 300 m, N. Vientiane, Lao, 1-4. V. 1995, K. Akita leg. (ZMUN).

***Ceratocorema yoshiyasui* sp. nov.** (Figs 3, 46)

Description. Holotype ♀ (Fig. 3). Alar expanse 19.5 mm, forewing length 8.2 mm, body length 8.5 mm, antenna 4.5 mm.

Head: antenna, frons, vertex, and pericephalic scales like in *C. hyalina* sp. nov.; labial palps silvery white, yellow apically. Thorax: black, with a very narrow yellow medial line, a yellow-white spot at forewing base, and a white spot below the wings; tegulae black, some yellow scales apically; patagia black shining, white laterally. Legs: neck plate white; fore coxa yellow with black margin; fore femur black; fore tibia yellow ventrally, black dorsally; fore tarsus yellow ventrally, black dorsally, with proximal two tarsomers white basally; mid leg black, mid femur with white posterior margin; mid tibial tufts mixed with white, yellow and orange brown scales in basal and in distal part, a black tuft in middle part; mid tarsus yellow ventrally, white dorsally, with distal end of each tarsomer black, basal tarsomer with a black tuft; hind leg black, hind coxa white; hind femur with white posterior margin, hind tibia with tufts of white and orange brown scales in middle part and at distal end, tibial spurs white ventrally; basal hind tarsomer with black tufted scales distally, other parts white-orange, remaining tarsomers yellow ventrally, white and black dorsally. Abdomen: black shining, tergite 1 with hidden orange scales anteriorly; tergite 2 narrow orange anterior margin; anal tuft orange yellow, laterally with two fan-like scale tufts, each yellowish basally, black apically; sternite 1-3 dirty-white mixed with black scales; sternite 6 yellow-orange. Forewing: opaque yellowish brown, semi-transparent cells in place of ATA, PTA and in posterior part of ETA. Hindwing: transparent, with brownish semi-transparent scales towards outer margin.

Female genitalia (gen. prep. No AK175, Fig. 46). Similar to that of *C. hyalina* sp. nov., but, antrum shorter, ductus bursae long, with regular lengthwise folds, towards corpus somewhat twisted; corpus bursae with a single relatively large signum.

Diagnosis. The new species is closest to *C. antiphanopa*, which can be separated by size (larger, alar expanse 18 mm in female), the invisible discal spot, the completely opaque forewings, the white labial palps, and the color of the tibial tufts (brown mixed with white). Both *C. postcristata* and *C. mesatma* can be distinguished by the maculation of the forewing (brownish with a distinct orange discal spot).

Habitat and bionomics. The type specimens were collected in late April at the edge of lowland tropical rainforest.

Distribution. Known only from the type locality.

Etymology. This beautiful species is dedicated to our friend Dr Y. Yoshiyasu (Kyoto Prefectural University, Kyoto, Japan), a well-known specialist in Pyralidae, who collected the holotype specimen.

Material examined. Holotype ♀, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 24. IV. 1998, Y. Yoshiyasu leg. (ZMUN). Paratype. 1 ♀, same date but 26. IV. 1998, T. Hirowatari leg. (ZMUN).

***Paranthrenopsis* Le Cerf**

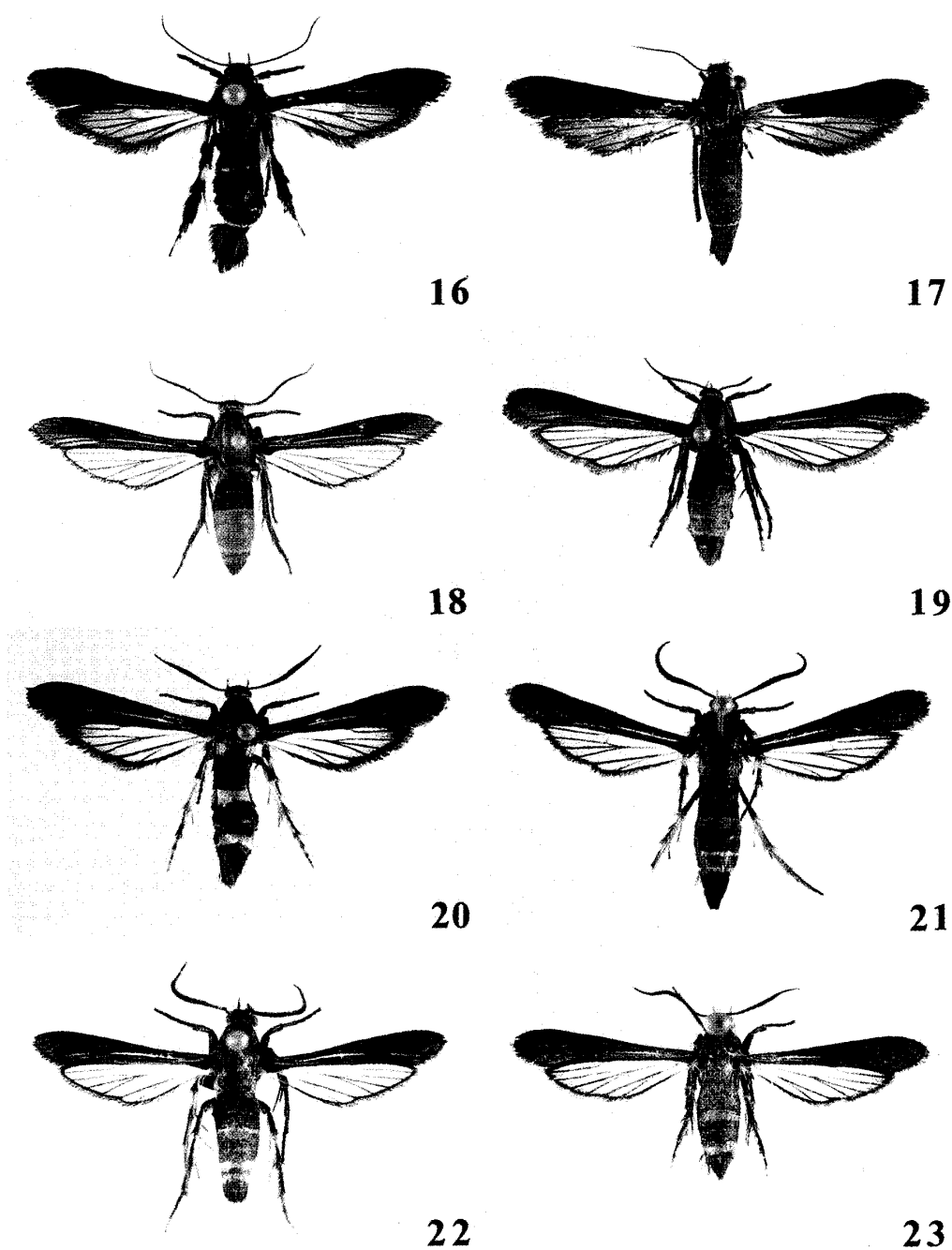
Paranthrenopsis Le Cerf, 1911: 302. Type species: *Paranthrenopsis harmandi* Le Cerf, 1911, by monotypy. Le Cerf, 1911: 302; Hampson, 1919: 113 (as a synonym of *Zenodoxus* Grote & Robinson, 1868); Dalla Torre & Strand, 1925: 180–181 (as a synonym of *Zenodoxus*); Naumann, 1971: 23, 52; Heppner & Duckworth, 1981: 22; Fletcher & Nye, 1982: 119–120; Spatenka *et al.*, 1993: 84; Spatenka *et al.*, 1999: 35 (key), 62; Gorbunov & Arita, 2000b: 247.

Oligophlebiella Strand, 1916: 49. Type species: *Oligophlebiella polishana* Strand, 1916, by monotypy. Dalla Torre & Strand, 1925: 4; Gaede, 1933: 778; Naumann, 1971: 22; Heppner & Duckworth, 1981: 44; Fletcher & Nye, 1982: 112; Arita, 1992: 97; Arita & Gorbunov, 1998: 142–143. **Syn. nov.**

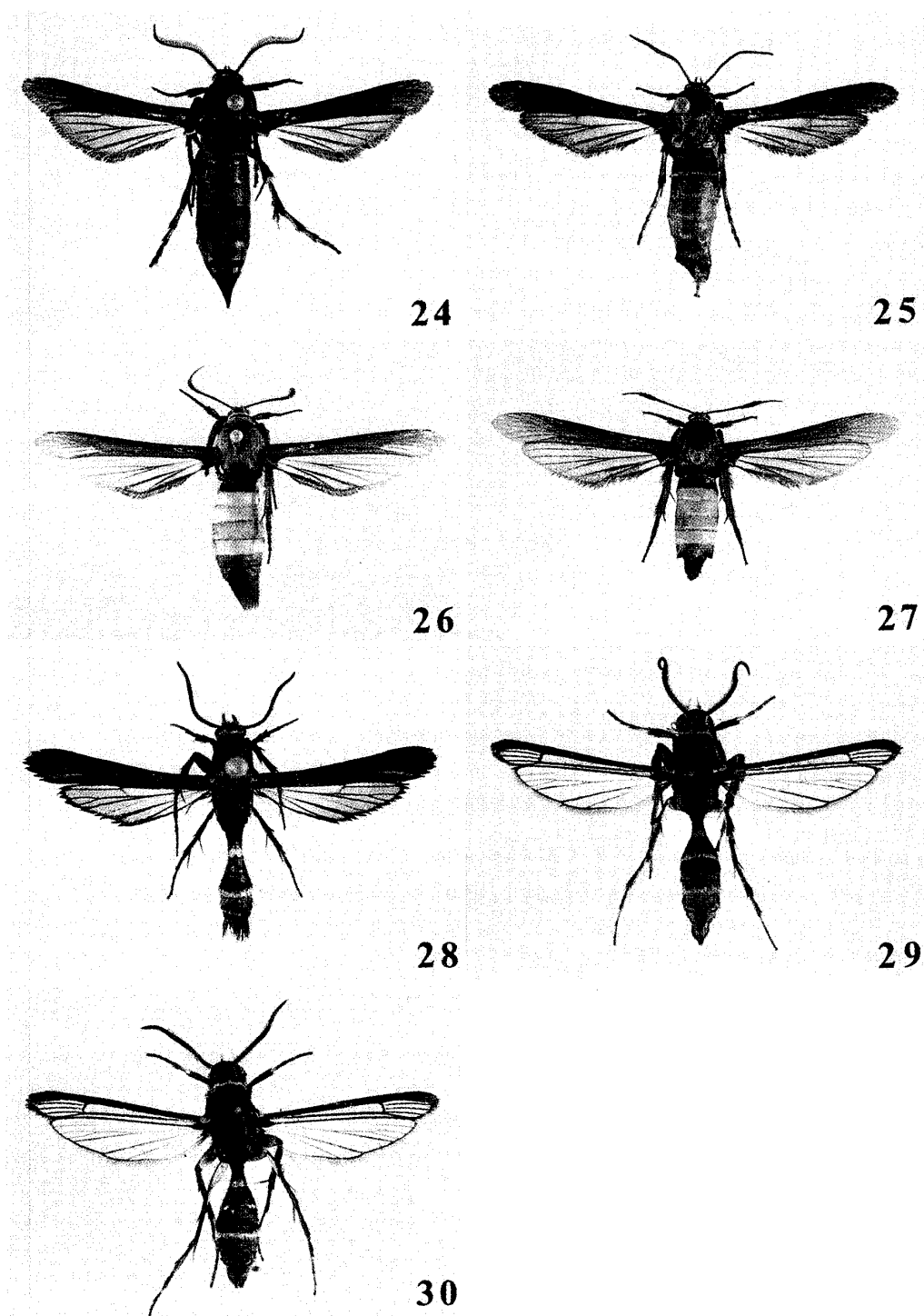
Up to now, the genus *Paranthrenopsis* was known only from two species from Japan and China respectively (Gorbunov & Arita, 2000b). Here we describe a new species from Vietnam, assign a species from Borneo to the genus and synonymize *Oligophlebiella* Strand, 1916 with it. The latter was treated by Gorbunov & Arita (1998) as distinct from *Paranthrenopsis* mainly because of the absence of vein Cu₂, the completely opaque forewings, and some minor differences between the female genitalia of the type species of the two genera. However, examination of additional specimens of *O. polishana* has shown that vein Cu₂ is present in some individuals and its absence is due to individual variation. Further, specimens of *Paranthrenopsis* from Vietnam and China, which belong to another yet undescribed species (Zukowsky, 1929, misidentified as *Oligophlebiella polishana* Strand, 1916) have completely opaque forewings though vein Cu₂ is present. The intraspecific variation shows that the presence or absence of the highly reduced and minute (probably nonfunctional) vein Cu₂ is not a prove for the existence of two different genera (compare also to diagnosis for *Paradoxecia* and *Trichocerota*). Therefore, *Oligophlebiella* is here treated as a junior subjective synonym of *Paranthrenopsis*.

Constitution. *Paranthrenopsis editha* (Butler, 1878), *P. siniaevi* Gorbunov & Arita, 2000; *P. polishana* (Strand, 1916), **comb. nov.**, *P. flavicincta* (Hampson, 1919), **comb. nov.**, and *P. flaviventris* sp. nov.

Distribution. Known from Vietnam, China, Japan, Taiwan, and Borneo.



Figs 16–23. Tinthiini of Vietnam. 16–17. *T. melli* sp. nov. 16. ♂, holotype, alar exp. 25 mm (ZMUN). 17. ♀, paratype, alar exp. 29 mm (MNHB). 18–19. *Paradoxecia myrmekomorpha* (Bryk, 1947), comb. nov. 18. ♂, alar exp. 25.5 mm (ZMUN). 19. ♀, alar exp. 32 mm (ZMUN). 20. *P. luteocincta* sp. nov. ♀, holotype, alar exp. 28.5 mm (ZMUN). 21. *P. karubei* sp. nov., ♀, paratype, alar exp. 25.5 mm (CHR). 22–23. *P. dizona* (Hampson, 1919), comb. nov. 22. ♂, alar exp. 19 mm (ZMUN). 23. ♀, alar exp. 24.5 mm (CAK).



Figs 24–30. Tinithiini, Pennisetiini, Similipepsini of Vietnam. 24–25. *P. tristis* sp. nov. 24. ♂, holotype, alar exp. 28.5 mm (CHR). 25. ♀, paratype, alar exp. 32.5 mm (ZMUN). 26–27. *Rectala magnifica* sp. nov. 26. ♂, holotype, alar exp. 44 mm (ZMUN). 27. ♀, paratype, alar exp. 44 mm (ZMUN). 28. *Corematosetia naumanni* gen. et sp. nov., ♂, holotype, alar exp. 25 mm (ZMUN). 29–30. *Similipepsis helicellus* sp. nov. 29. ♂, holotype, alar exp. 15 mm (ZMUN). 30. ♂, paratype, alar exp. 15 mm (ZMUN).

***Paranthrenopsis flaviventris* sp. nov.** (Figs 4, 47)

Description. Holotype ♀ (Fig. 4). Alar expanse 24.5 mm, forewing length 11.0 mm, body length 12.0 mm, antenna 4.8 mm.

Head: antenna filiform, densely scaled, black, 15 apical joints yellow; labial palps smooth-scaled, orange-yellow; frons blackish grey shining, covered with pale yellow scales almost throughout; vertex black, mixed with some yellow scales; pericephalic scales completely orange-yellow. Thorax: blackish; patagia fuscous shining, laterally with an orange-yellow spot, which extends into an orange-yellow stripe on the prothorax; thorax dorso-submedially with some yellow scales; laterally in medial and posterior part with patches of yellow scales. Legs: neck plate and fore leg orange-yellow almost throughout, fore tarsus with only few black scales; mid leg orange yellow, mid coxa and mid femur black proximally; hind coxa basally black, distally yellow; hind femur with medial side and edges yellow, lateral side black; hind tibia and tarsus orange-yellow, laterally partly mixed with black. Abdomen: dark brownish fuscous, all tergites orange-yellow laterally, especially intensive on tergites 1–3; tergite 1 with a narrow whitish posterior margin; tergite 4 orange-yellow in anterior half; tergite 5 with some orange-yellow scales in anterior half; tergite 6 with such scales in posterior half and narrow white-yellow posterior margin; sternites bright orange-yellow throughout; anal tuft dorso-medially black, dorso-laterally, ventrally and apically orange. Forewing: brownish black, basally and between veins with some orange-yellow scales; costal margin orange-yellow, ATA short and broad, PTA opaque, ETA small and round, consisting of 3 small cells between R_5 and Cu_1 ; vein Cu_2 present but minute. Hindwing: hyaline; outer margin black, broad, especially towards the apex broader than length of fringes; ventral side with costal and anal margin and basal part of the veins orange-yellow.

Female genitalia (gen. prep. No AK176, Fig. 47). Ovipositor short; papilla anales relatively small; posterior apophysis slightly shorter than anterior pair; 8th tergite well sclerotized; ostium membranous; antrum narrow, with a short sclerotization; ductus bursae broad; corpus bursae with two well defined signa.

Variability. The female paratype is slightly smaller with an alar expanse of 22.0 mm.

Diagnosis. This new species is similar to *Paranthrenopsis editha* from Japan, and *P. siniaevi* from China, by external characteristics but can easily be distinguished by the lack of signa of the corpus bursae of the female genitalia. *P. flaviventris* sp. nov. is also similar to *P. flavicincta* from Borneo, but differs by the extensive yellow scaling of the first abdominal segments and the shorter ETA and ATA. The new species is also similar to *Paranthrenopsis polishana* (Strand, 1916), comb. nov., from Taiwan. This latter species can be distinguished by the entirely opaque forewings, the entirely dark brown anal tuft and the absence of signa of the corpus bursae (comp. to Arita & Gorbunov, 1998).

Habitat and bionomics. The type specimens were collected at the edge of submontane subtropical rainforest between late April and May.

Distribution. Known only from northern Vietnam.

Material examined. Holotype ♀, N. Vietnam, Ha Tay Prov., Mt Tan Vien, 690–1,000 m, 28. IV. 1995, A. Shinohara leg. (ZMUN). Paratypes. 1 ♀, same data as holotype (ZMUN); 6 ♀, N. Vietnam, Cao Bang Prov. Mt Pia Oac, 1,200–1,400 m, 22–27. V. 1999, M. Owada leg. (NSMT); 1 ♀, N. Vietnam, Vinh Phu Prov., Tam Dao, 950 m, 17. V. 1999, H. Kurahashi leg. (NSMT).

***Caudicornia* Bryk**

Caudicornia Bryk, 1947: 104–105. Type species: *Caudicornia xanthopimpla* Bryk, 1947, by monotypy. Naumann, 1971: 13; Heppner & Duckworth, 1981: 43; Fletcher & Nye, 1982: 32; Gorbunov & Arita, 2001 (in press).

A redescription of the genus and the type species given by Gorbunov & Arita (2001, in press) is based on the female holotype of *C. xanthopimpla* Bryk, 1947. Recently, some male specimens of this species were discovered in northern Vietnam. We here provide an extended species diagnosis given below.

Additionally, another species of the genus was found, of which the ♂ differs by a highly peculiar anal tuft, which consists of two very long lateral pencils of scales. However, apart from this external morphologic character no proof for a generic difference was found. We here place this species in the genus *Caudicornia* though this combination needs further attention.

Constitution. *Caudicornia xanthopimpla* Bryk, 1947 (the type species), *C. aurantia* (Hampson, 1919), **comb. nov.**, *C. flavus* (Xu & Liu, 1992), **comb. nov.**, and *Caudicornia tonkinensis* sp. nov.

Bionomics. The larvae of *C. tonkinensis* sp. nov. live in the stem of a *Rubus* species (Rosaceae).

Distribution. The genus is known from north-eastern India, Upper Burma, southern China, and Northern Vietnam.

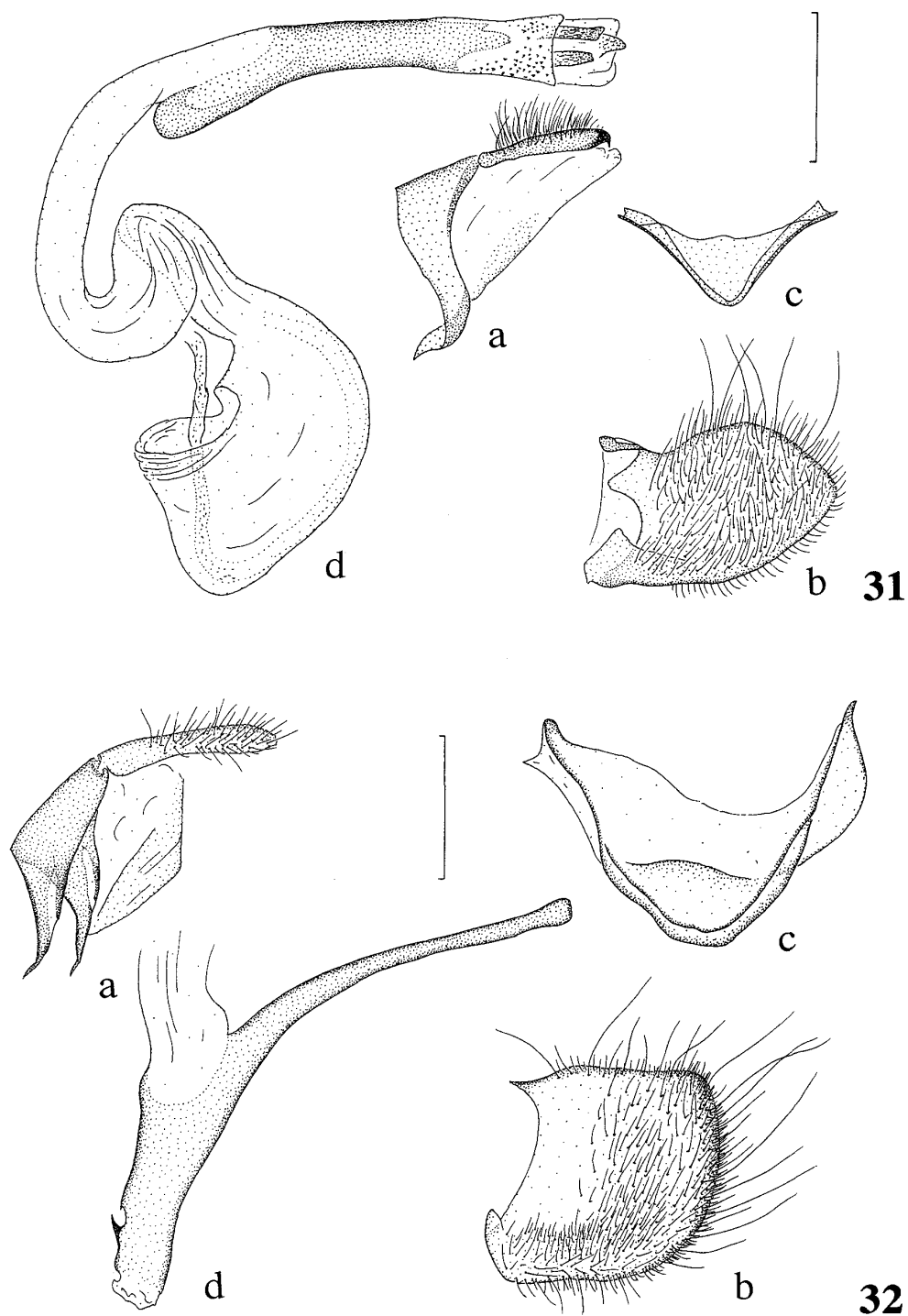
***Caudicornia xanthopimpla* Bryk (Figs 5, 32)**

Caudicornia xanthopimpla Bryk, 1947: 105, tab. 1, fig. 11 (not 10!). Type locality: Nordbirma, Kambaiti [=NE Myanmar, Kambaiti]. Holotype ♀, (not ♂!) in RMS. Heppner & Duckworth, 1981: 43; Gorbunov & Arita, 2001 (in press).

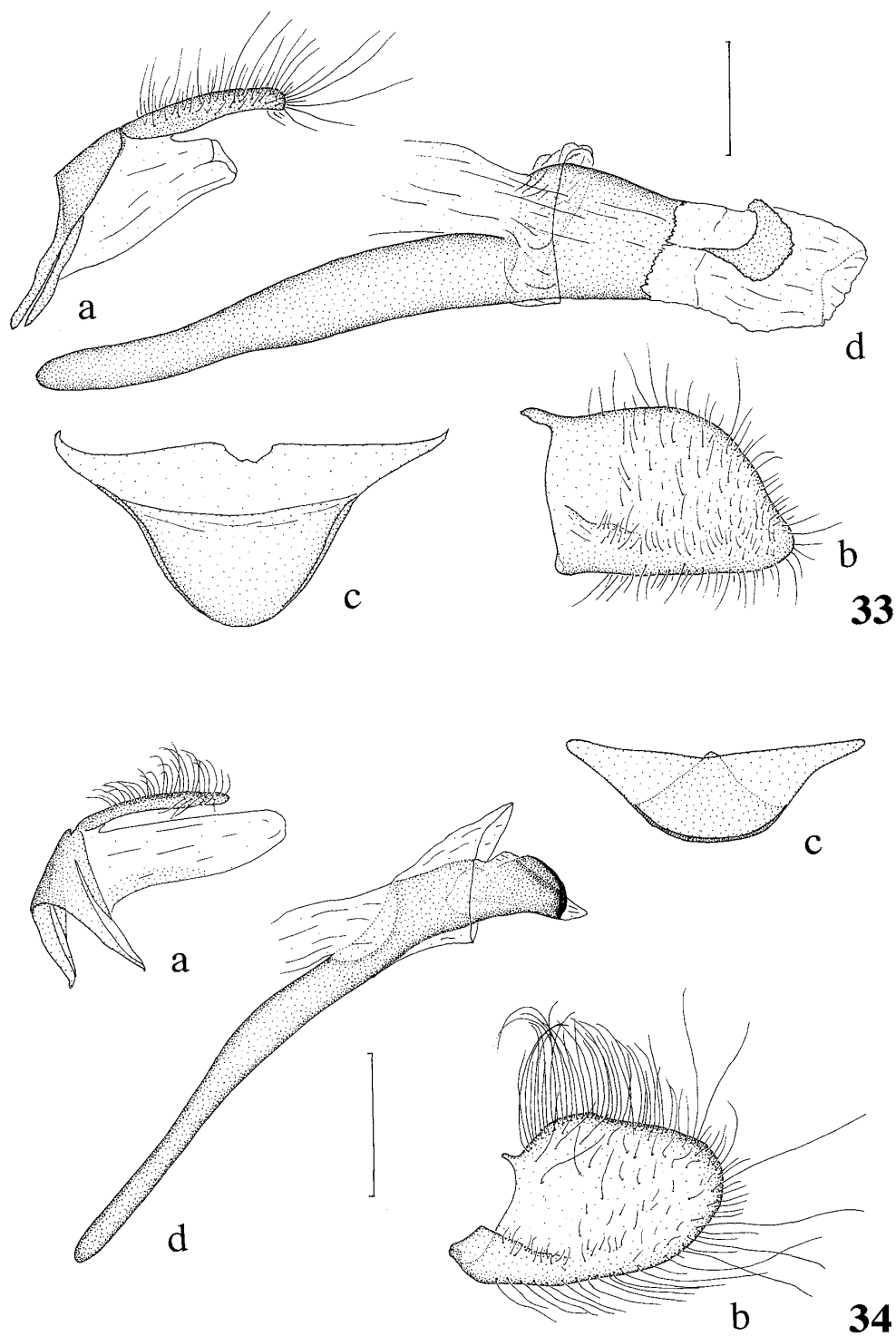
Description. Male (Fig. 5). Alar expanse 32.0 mm, forewing length 15.0 mm, body length 16.5 mm, antenna 8.0 mm.

Head: antenna short bipectinate, long ciliate, yellow, black in apical part; labial palps long, relatively straight, ventrally rough-scaled, yellow; proboscis developed; frons black, shining; vertex black, yellow near scape and in posterior part. Thorax: patagia black, basally yellow; tegulae black with some yellow scales; metathorax yellow posteriorly and some yellow hair-like scales submedially. Legs: yellow, common joints of femurs and tibiae black; hind femur mainly black. Abdomen: ground colour of tergites black; each tergite at lateral side and in anterior part, leaving a black triangle on each tergite dorsally; sternites yellow throughout densely yellow scaled; anal tuft simple, relatively long, blunt ending, short ventrally, orange-yellow. Forewing: all transparent areas well developed, somewhat rusty shining; veins black, with some yellow scales basally; Cu₂ small; discal spot well developed, narrow at anal margin, very broad at costal margin, with a short projection into ATA; PTA almost reaching discal spot; ETA consisting of 4 cells; apical area broad, especially towards apex, black with some yellow scales; ventral side with veins stronger yellow in basal half. Hindwing: transparent, with narrow fuscous outer margin; fringes short.

Male genitalia (gen. prep. No AK164, Fig. 32). Uncus weakly sclerotized, finger-shaped, not



Figs 31-32. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedaeagus. Scale bars: 0.5 mm. 31. *Ceratocorema hyalina* sp. nov. (holotype, gen. prep. AK194) (ZMUN). 32. *Caudicornia xanthopimpla* Bryk, 1947 (gen. prep. AK164) (CAK).



Figs 33–34. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedeagus. Scale bars: 0.5 mm. 33. *Caudicornia tonkinensis* sp. nov. (paratype, gen. prep. YA 1696) (ZMUN). 34. *Entrichella pogonias* Bryk, 1947 (gen. prep. AK173) (ZMUN).

pointed, with short setae; tuba analis weakly sclerotized ventrally; tegumen small; valva small, quadrangular, apex at dorsal margin, inner surface sparsely clothed with short setae, with longer setae near outer margin; aedaeagus long, about 3 times longer than valva, bent, subapically with a short and strong spine, coecum penis long; vinculum short; sacculus small, rounded.

Diagnosis. This species is similar to *C. aurantia*, which however is larger (36–40 mm), has a smaller ETA consisting of only 3 small transparent cells, and differs by the coloration of the abdomen (with orange bands on tergites 1–6, interrupted dorsally on the first four).

Habitat and bionomics. The specimens were collected in mid June at the edge of a montane subtropical forest at an altitude of nearly 2,000 m. The locality is a small valley characterized by its wet, partly swampy ground. The climate is humid with high precipitation in most time of the year and misty conditions frequently. The specimens were attracted to the pheromone lures during fair conditions in the afternoon. The host plant remains unknown.

Distribution. Known from the type locality in northern Myanmar (Burma) and from northern Vietnam.

Material examined. 3 ♂, N. Vietnam, Lao Cai Prov., Fan Si Pan Mts, near Sa Pa, mount. forest, ca 1,950 m, 20–21. VI. 1999, leg. B. Tanaka (ZMUN); 2 ♂, same data (CAK).

***Caudicornia tonkinensis* sp. nov.** (Figs 6, 7, 33, 48)

The species is characterized by a remarkable sexual dimorphism: ♂ with small, rudimentary or without transparent areas, with two extremely long and narrow lateral tufts of scales of anal tuft, tergites black, sternites white; females similar to *C. xanthopimpla* and related species.

Description. Holotype ♀ (Fig. 7). Alar expanse 40.0 mm, forewing length 19.0 mm, body length 19.0 mm, antenna 9.0 mm.

Head: antenna black, filiform, scaled, scape and the first 6–10 segments partly covered with orange scales; labial palps orange, smooth; frons bright orange, pericephalic scales orange; vertex orange, only in middle part a patch of black scales. **Thorax:** dorsally black; tegulae in proximal half and apically covered with orange scales; patagia orange-yellow, with two patches of black scales submedially; posterior part and metathorax dorsally orange; thorax ventrally bright orange-yellow to orange-red. **Legs:** orange almost throughout, a white spot in hind femur at tibial joint. **Abdomen:** ground colour from dark fuscous tile-like shining scales; tergites 1–3 covered with orange-red narrow scales throughout; tergites 4–5 covered with orange-yellow narrow scales throughout; tergite 6 covered with black narrow scales submedially; anal tuft blackish, with some yellow scales sublaterally; sternites 1–5 pale yellow, sternite 6 black, mixed with yellow scales medially; anal tuft black, ventrally with some yellow scales. **Forewing:** ground colour of scaled parts brownish black; veins and discal spot more or less covered with orange yellow scales; ATA and PTA well developed, the latter reaching discal spot; ETA relatively small and triangular, with only a very small cell between R_5-M_1 ; discal spot very broad and well developed, with a small projection into ATA, discal area very broad, black; ventral side similar but more orange-yellow, only apical area black. **Hindwing:** transparent, yellowish-rusty; veins fuscous but densely covered with orange scales, except from cross vein; discal spot small, orange; outer margin dark, mixed with orange especially in anal area; very broad in apical area, reaching 1/3 of distance to discal spot; fringes dark, partly yellow in anal area; ventral side similar but more orange-yellow, only apical area black.

Female genitalia (gen. prep. No AK180, Fig. 48). Ovipositor short; papilla anales broad; posterior and anterior apophysis of about equal length; ostium broad, membranous; antrum very short, with a narrow, ventrally open sclerotized ring; ductus bursae long, broad, with regular lengthwise folds; corpus bursae small with two weak signa.

Male (paratype, Fig. 6). Alar expanse 28.5 mm, forewing length 13.0 mm, body length 14.0 mm (without anal tuft), antenna 7.5 mm.

Head: similar to that of ♀ but with antenna short bipectinate, ciliate. Thorax: similar to that of ♀. Forewing: completely fuscous opaque; position of ATA, PTA, and discal spot marked by extensive orange scaling; ventral side orange almost throughout, only apical area fuscous. Legs: similar to that of ♀ but hind leg with tibia whitish, in proximal half mixed with orange scales laterally, dorsally with black scales; tibial tufts orange; tarsus black. Abdomen: mainly black, dorsally with only few orange scales; sternites 1+2 yellow-white; sternites 3-7 white; anal tuft black, highly specialized by exposing 2 lateral, very long (about 4 mm) and narrow tufts of hair-like scales. Hindwing: transparent only partly, densely scaled in outer part, almost reaching discal spot.

Male genitalia (gen. prep. No. YA 1696, Fig. 33). Uncus finger-shaped, weakly sclerotized, with long hair-like setae; tuba analis simple membranous; tegumen narrow; vinculum short, saccus short and rounded; valva with inner surface sparsely clothed with short hairs, angular, with apex at ventral margin; aedaeagus long and strong, with a well developed coecum penis, apically with a sclerotized plate.

Variability. Variable in size with alar expanse in ♀ from 37.5 to 41.5 mm, in ♂ from 27 to 30 mm.

Diagnosis. *C. tonkinensis* sp. nov. is somewhat similar to *C. aurantia*. The latter can be differentiated by the smaller ETA, by the yellow, only apically black antennae, and by the narrow outer margin in the apex of the hindwing.

For the moment it is not clear whether *C. tonkinensis* sp. nov. and *C. aurantia* really belong to the genus *Caudicornia*. Males of *C. tonkinensis* sp. nov. differ from males of *C. xanthopimpla* (the type of genus) by the almost completely opaque forewings and the peculiar lateral anal tuft. Since the range of intrageneric variation in *Caudicornia* is not known yet, we at present avoid the establishment of another new generic name.

Habitat and bionomics. The species was collected in different localities at the edges of tropical submontane forests between 930 and 1,230 m. A single female was reared from wild raspberry (*Rubus reflexus*, Rosaceae). The larva was boring in the pith of the stem close to base. Since specimens were found only from May to early July, the species appears to be univoltine. Males have been attracted to artificial pheromones in the afternoon.

Distribution. Known from northern Vietnam and southern China (Fukien).

Material examined. Holotype ♀, N. Vietnam, Vinh Phu Prov., Tam Dao, 930 m, 3. V. 1998, B. Tanaka leg. (ZMUN). Paratypes. 1 ♂, N. Vietnam, Vinh Phu Prov., Tam Dao, 1,230 m, 20. V. 1995, A. Saito leg. (ZMUN); 1 ♀, same data, 5. VI. 1996, H. Karube leg. (ZMUN); 2 ♀, same data, 13-16. V. 1997, K. Horie leg. (ZMUN, CAK); 1 ♂, same data, 1. VI. 1997, Y. Okushima leg. (ZMUN); 1 ♀, same data, 2. VI. 1997 (ZMUN); 1 ♂, same data, 6. V. 1998, Y. Arita leg. (CAK); 5 ♂ 3 ♀, same data, 1-8. V. 1998, Riefenstahl & Wagenblass leg. (CHR); 4 ♂ 1 ♀, same data, 1,230 m, 20. V. 1998, N. Kanie leg. (ZMUN); 1 ♂, same data, N. Yuzawa leg. (ZMUN); 1 ♀, same locality, 15. V. 1998 ex larva, ex *Rubus reflexus*, M.

Ikeda leg. (CMI); 1 ♀, Tonkin, Dallier/*Zenodoxus aurantia* Ham. [*sic!*] (ZMUN); 1 ♀, China, Fukien, Kuatun, 8. VII. 1946 (Tschung sen.) (MNK); 1 ♂ 2 ♀, "22" [South China?] ex coll. Mell (MNHB).

Entrichella Bryk

Entrichella Bryk, 1947: 102. Type species: *Entrichella pogonias* Bryk, 1947, by monotypy. Naumann, 1971: 16, 52 (as a synonym of *Paranthrenopsis* Le Cerf, 1911); Heppner & Duckworth, 1981: 22 (as a synonym of *Paranthrenopsis*); Fletcher & Nye, 1982: 57; Spatenka *et al.*, 1993: 85 (as a synonym of *Paranthrenopsis*); Spatenka *et al.*, 1999: 35 (key), 44 (as a synonym of *Paranthrenopsis*); Gorbunov & Arita, 2001 (in press) (as a distinct genus).

The genus *Entrichella* has been restored and redescribed by Gorbunov & Arita (2001, in press). The authors examined the type species of the genus and found it to be similar and closely related to *Trichocerota constricta* Butler, 1878. The species-group which is now separated as *Entrichella* typically shows a remarkable sexual dimorphism. ♂ of this genus have a comparable large ETA, while the ♀ have brownish almost entirely opaque forewings with a small or almost absent ETA. The male antenna is long bipectinate-ciliate, the aedaeagus bears a well sclerotized collar shaped crista distally. The antenna of the female is filiform, the corpus bursae of the genitalia have none or two small signa, a simple and short antrum and a lamella postvaginalis which consists of two narrow, well sclerotized, submedial stripes that are fused distally (also see Gorbunov & Arita, 2001, in press). A main feature of the species-group which might be an autapomorphic character, is the specialized structure of tergite 7 and the anal tuft in ♀, which is rough-scaled, blunt ending in *Entrichella* but smooth-scaled and pointed in related genera. Other characters, like the bipectination of the antenna cannot prove a generic difference, since they are also found in the closely related genera *Paradoxecia* and *Trichocerota*.

At present we include only the following species in the genus *Entrichella*: *E. constricta* (Butler, 1878) (Japan), *E. yakushimaensis* (Arita, 1993) (Japan), *E. shakojianus* (Matsumura, 1931) (Korea), *E. pogonias* Bryk, 1947 (China, Vietnam), *E. meilinensis* (Xu & Liu, 1993), **comb. nov.** (China), *E. leiaeformis* (Walker, 1856), **comb. nov.** ("N China" [Shanghai?]), *E. fuscus* (Xu & Liu, 1992), **comb. nov.** (China), *E. simifuscus* Xu & Liu, 1993, **comb. nov.** (China), *E. esakii* (Yano, 1960) (Japan), *E. trifasciatus* (Yano, 1960), **comb. nov.** (Taiwan), *E. gorapani* (Arita & Gorbunov, 1995) (Nepal), *E. erythranches* (Meyrick, 1926) (Sikkim), *E. linozona* (Meyrick, 1926) (Assam), and *E. tricolor* sp. nov. (Vietnam).

Bionomics. At least some of the species grouped in *Entrichella* are borers in Rosaceae, like *Rosa* (*E. constricta*) and *Rubus* (*E. constricta*, *E. esakii*, *E. yakushimaensis*, *E. linozona*) (Fletcher, 1933; Yano, 1960; Arita & Yata, 1986; Arita, 1993).

Entrichella pogonias Bryk (Figs 8, 9, 10, 34)

Entrichella pogonias Bryk, 1947: 103. Type locality: China, Prov. Kiangsu [=China, Prov. Jiangsu]. Holotype ♀, in RMS. Naumann, 1971: 53, 139 (fig. 15), 142 (fig. 54), 165 (fig. 169) (*Paranthrenopsis*); Heppner & Duckworth, 1981: 22 (*Paranthrenopsis*); Spatenka *et al.*, 1993: 85 (*Paranthrenopsis*); Spatenka *et al.*, 1999: 45, pl. 2 fig. 8, 514–515, fig. 287 (*Paranthrenopsis*); Gorbunov & Arita, 2001 (in press).

The species was redescribed and compared to *E. constricta* by Gorbunov & Arita (2001, in

press). The specimens from Vietnam, here identified as *E. pogonias*, fit this diagnosis and are found to be different from the closely related *E. constricta* by minor external characteristics. Constant differences are observed in the color of the thorax at the forewing base and of the pericephalic scales dorsally (with yellow scales in *E. pogonias*, absent in *E. constricta*). The genitalia of ♂ and ♀ display little differences in the relative size and the shape of single parts (valva more rounded, saccus somewhat larger in *E. pogonias*).

Male genitalia (gen. prep. AK173, Fig. 34). Uncus long, finger-shaped, weakly sclerotized and not pointed, dorsally with long hair-like setae; tuba analis large, slightly sclerotized ventrally; tegumen small; vinculum short, saccus short and broad; valva somewhat narrowed distally, inner surface sparsely clothed with individual short hairs and with long hairs near outer margin; aedaeagus with a long and narrow coecum penis, apically well sclerotized, sharply edged and pointed.

Female genitalia (gen. prep. AK174). The genitalia of the examined female of *E. pogonias* from northern Vietnam perfectly fit to the figure and description given by Gorbunov & Arita (2001, in press).

Variability. The specimens are remarkable variable especially in body size and extension of the ETA. This kind of variation is also seen in the closely related Japanese *E. constricta* (alar expanses in males 14.5–16.5 mm, in females 16.5–24.5 mm).

Habitat and bionomics. Specimens were collected from late April to late June at the edges of lowland to submontane tropical rainforest or in secondary forest.

Distribution. Known only from the type locality in south-eastern China and from northern Vietnam. Records of *E. constricta* from eastern China (Spatenka *et al.*, 1999) are likely to refer to *E. pogonias* or *E. leiaeformis*.

Material examined. 1 ♀, N. Vietnam, Tam Dao, 20. VI. 1990 (CAK); 1 ♂, N. Vietnam, Vinh Phu Prov., Yen Bai, 18. V. 1995, M. Sato leg. (ZMUN); 1 ♀, N. Vietnam, Vinh Phu Prov., Tam Dao, 1,230 m, 2. VI. 1997, Y. Arita leg. (ZMUN); 1 ♀, same data, 930 m, 6. V. 1998 (ZMUN); 1 ♀, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 160 m, 27. IV. 1996, B. Tanaka leg. (ZMUN); 2 ♂ 1 ♀, same data, 250 m, 24. IV. 1998, Y. Arita leg. (ZMUN); 2 ♀, same data, Riefenstahl & Wagenblass leg. (CHR); 2 ♀, same data, 370 m, 25. IV. 1998, Y. Arita (ZMUN); 1 ♀, same data, Y. Yoshiyasu leg. (ZMUN).

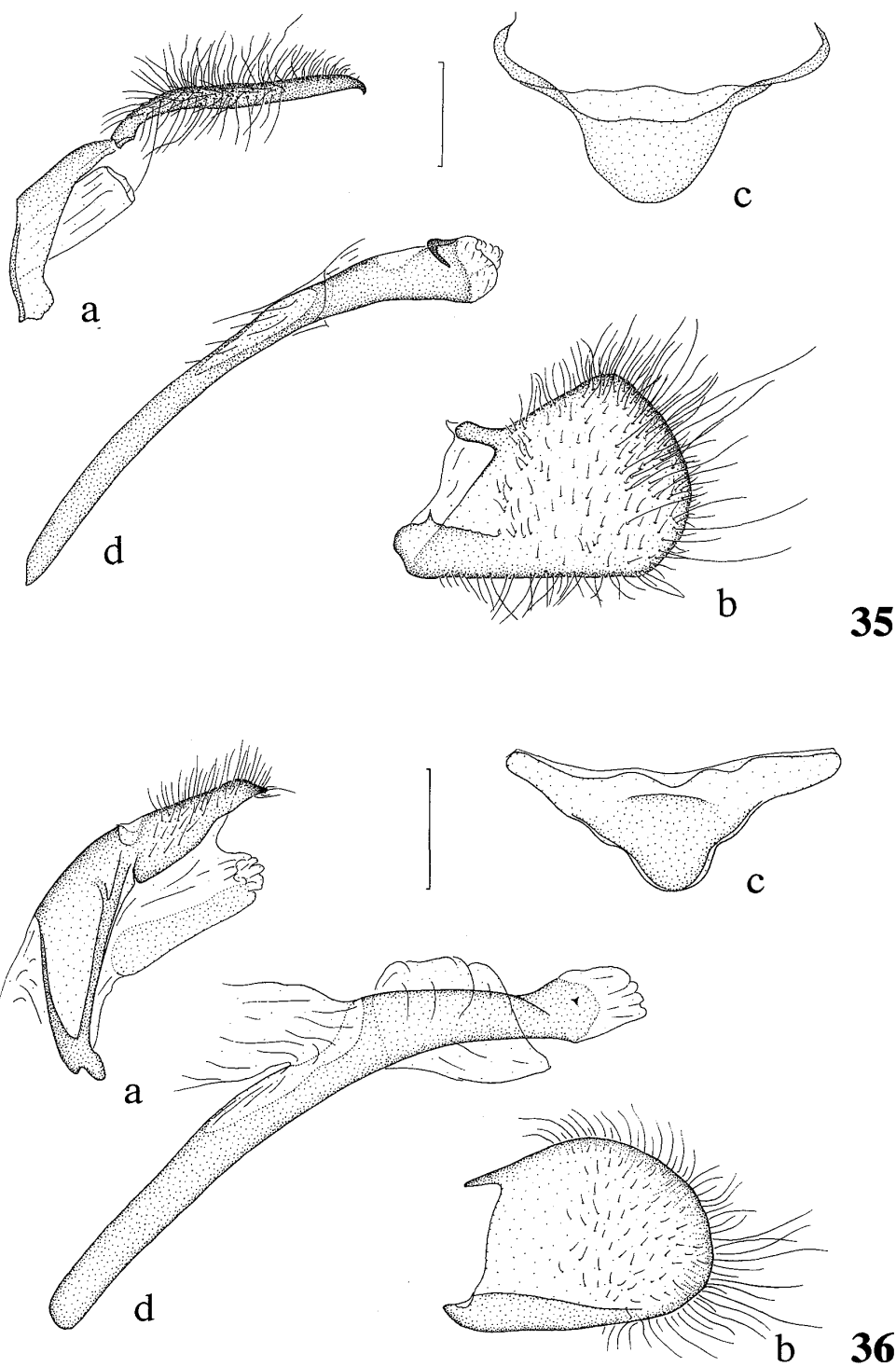
Remarks. Very likely, *E. leiaeformis* (Walker, 1856) and *E. meilinensis* (Xu & Liu, 1993) are conspecific and could both be treated as synonyms of *E. pogonias* Bryk, 1947. However, the holotypes of these species were not examined yet, so we refrain from formal synonymization at the moment. Additionally, it cannot be excluded, that *E. shakojianus* (Matsumura, 1931) from Korea is another junior subjective synonym of this species. But, without additional material from Korea or northern China we are not able to synonymize it now.

***Entrichella tricolor* sp. nov.** (Figs 11, 12, 35, 49)

Trichocerota dizona Hampson, 1919: Zukowsky, 1929: 37 (misidentification).

Description. Holotype ♂ (Fig. 11). Alar expanse 23.5 mm, forewing length 10.8 mm, body length 11.5 mm, antenna 6.5 mm.

Head: antenna ciliate, black, scape white laterally; labial palps long upcurved, dirty-yellow, ventrally white; black, with a small bunch of long narrow brownish scales posteriorly close



Figs 35-36. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedeagus. Scale bars: 0.5 mm. 35. *Entrichella tricolor* sp. nov. (paratype, gen. prep. AK177) (ZMUN). 36. *Trichocerota proxima* Le Cerf, 1916 (gen. prep. AK210) (ZMUN).

to the eyes; frons, smooth-scaled, anthracite shining; vertex black; pericephalic scales white. Thorax: black, with an orange-red transverse streak in posterior part. Legs: neck plate blackish; fore coxa orange-yellow, mixed with black scales except from distal end and lateral edge; fore tibia black with orange scales along medial margin; fore tarsus black, basal tarsomer yellow ventrally, with long pointed reddish brown spine-like scale tufts; mid coxa black, some white scales distally; mid femur black, lateral side mixed with white and yellow especially in distal part; mid tibia black with some white and yellow proximally and reddish brown spine-like scale tufts proximally, tibial spurs long with dorsal edges with a row of long scales; mid tarsomers black, with tufts of reddish brown scales proximally; hind coxa white, black basally; hind femur black with narrow white ventral edge; hind tibia like mid tibia; hind tarsus similar to mid tarsus but with ventral side yellowish. Abdomen: tergites 1-5 black, tergite 4 with a broad orange-red band anteriorly, tergite 5 with a narrow white anterior band (sometimes hidden by tergite 4) mixed with individual orange scales, tergites 6-7 rough-scaled, greyish brown, mixed with individual dirty-white scales, especially at posterior margin; anal tuft black dorsally with some grey scales; sternites black, sternite 1 with a small white lateral spot, sternites 4-5 snow-white with few black scales latero-posteriorly. Forewing: brownish; ATA present; PTA opaque; ETA consisting of 4 cells between R_5 and Cu_1 ; apical area of about the size of ETA; ventral side similar, with costal margin narrow orange-yellow; vein Cu_2 minute. Hindwing: transparent throughout, towards outer margin somewhat rusty shining, veins brownish.

Male genitalia (gen. prep. No AK177, Fig. 35). Uncus very long, finger-shaped, apically pointed, vinculum short and narrow, saccus bag-like; valva angular, with apex at dorsal margin; aedaeagus apically with a sickle-like well sclerotized plate, coecum penis long, apically pointed.

Female (paratype, Fig. 12). Alar expanse 30.0 mm, forewing length 13.5 mm, body length 13.5 mm, antenna 7.0 mm.

Very similar to ♂ but larger and heavier built: antenna filiform; fore coxa with orange-yellow margin broader; hind leg with distal end of femur snow-white; abdominal tergites black, tergite 4 with orange stripe anteriorly; anal tuft dirty-grey; ventro-laterally with small black tufts; sternites 4-5 white, each with a narrow black posterior margin; transparent cells of forewing and outer half of hindwing covered with brownish semi-hyaline scales.

Female genitalia (gen. prep. No AK193, Fig. 49). Ovipositor short; papilla anales relatively broad; posterior apophysis shorter than anterior pair; 8th tergite relatively narrow, with weak setae at posterior margin; ostium broad, membranous; antrum with a narrow sclerotized ring; corpus bursae large, bulbous, with two small, well defined signa.

Variability. The specimens vary little in coloration and somewhat in size with alar expanses in males 19-24 mm and in females 26-30 mm.

Diagnosis. By the combination of the orange and white bands and the black ground coloration of tergites 4 and 5 respectively, this new species can not be confused with any other species of *Enrichella* or a related genus.

Habitat and bionomics. The species is found in a broad range of different habitats. Secondary forest, edges of tropical lowland to submontane forest and urban garden areas at altitudes from 370 to 1,500 m are inhabited. Depending on the altitude specimens are on the wing from early May to early July. Males are attracted to pheromones in the late afternoon.

Distribution. Known from northern Vietnam and southern China.

Material examined. Holotype ♂, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 24–25. IV. 1998, Y. Yoshiyasu leg. (ZMUN). Paratypes. 1 ♂, same data as holotype (ZMUN); 1 ♂, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 24–26. V. 1995, S. Ueno leg. (ZMUN); 1 ♀, same data, A. Saito leg. (ZMUN); 1 ♂, Viet Nam, Prov. Ha Tay, Ba Vi, 10. V. 1998, H. Riefenstahl & B. Wagenblass leg. (CHR); 11 ♂, N. Vietnam Vinh Phu Prov., Tam Dao, 930 m, forest edge, 17–18. VI. 1999, A. Kallies & Y. Arita leg. (CAK); 1 ♂ 1 ♀ [South China, Tsha yuen shan, 19. VI. 1915]/*Tr. dizona* [*sic!*] [Zukowsky det.] (MNHB).

Trichocerota Hampson

Trichocerota Hampson, 1893: 188 (key), 199. Type species: *Trichocerota ruficincta* Hampson, 1893, by original designation. Hampson, 1919: 51 (key), 116–118; Dalla Torre & Strand, 1925: 183–185 (as *Trichocerata* [*sic!*]); Gaede, 1933: 798–800; Naumann, 1971: 30; Heppner & Duckworth, 1981: 22; Fletcher & Nye, 1982: 164; Spatenka *et al.*, 1993: 85; Spatenka *et al.*, 1999: 35 (key), 46.

In the present view, the genus *Trichocerota* is a heterogeneous group of species which probably do not form a monophyletic group. Several attempts have been made to divide this group by external and genitalic characters (comp. to Hampson, 1919; Gorbunov & Arita, 2001, in press). However, no satisfying solution has been established yet. Complexes of characters, like the structure of the male antennae (bipectinate-ciliate or ciliate) or the structure of the female genitalia (presence or absence of signa and the presence or absence of anterior processes of the lamella postvaginalis), which have been used in these studies, have shown not to correspond to each other and are not suitable alone. Additionally, only a few species (but not the type species of the genus, *T. ruficincta* Hampson, 1893) have been studied in detail. We here use the established generic combinations *sensu auctorum*, though we are aware, that there is a need of revision of the entire group.

The following species from China were described in *Zenodoxus* Grote & Robinson, 1868, a genus exclusively distributed in the Nearctic and Neotropical regions. According to the descriptions given by the authors and taking into consideration zoogeographical aspects, they are hereby transferred to *Trichocerota*: *T. tianpingensis* (Xu & Liu, 1993), **comb. nov.**, *T. rubripectus* (Xu & Liu, 1993), **comb. nov.**

Trichocerota proxima Le Cerf, **comb. rev.** (Figs 13, 36)

Trichocerota proxima Le Cerf, 1916: 11, pl. 377, fig. 3157. Type locality: Haut Birmanie, Etat de Momeit, 600 m. Holotype ♂, in MNHP. Le Cerf, 1917: 372–374.

Zenodoxus proxima Hampson, 1919: 118; Dalla Torre & Strand, 1925: 181; Gaede, 1933: 799, pl. 94, row i; Heppner & Duckworth, 1981: 22.

Male (Fig. 13). Alar expanse 25.8 mm, forewing length 11.5 mm, body length 12.5 mm, antenna 5.0 mm.

Head: antenna black, red ventrally, ciliate with cilia located on a separate hook on each antennal segment, these hooks especially prominent in subapical part of antenna, apical part without hooks; labial palps ochreous brown, mid joint reddish laterally, white and black ventrally, basal and mid joint rough-scaled; proboscis well developed; frons black, leaden grey shining; vertex smooth-scaled, covering half of the eyes, basally black, distally ochreous brown; pericephalic scales white, dorsally yellow and black. Thorax: fuscous, patagia

laterally, tegulae basally with few ochreous and red scales; metathorax with narrow dirty-white posterior margin dorsally and white hair-like scales submedially. Legs: neck plate dirty-white; fore coxa black, basally with a red patch; lateral margin rough-scaled, mixed with ochreous scales; fore femur black with red scales; fore tibia orange-yellow ventrally, black dorsally, spine-like scales red; tarsus black, yellow mixed ventrally, mid and hind coxae brownish basally, white distally; mid and hind femora blackish with red scales, posterior margin white; mid and hind tibiae blackish, ventrally reddish, mixed with individual white scales; tarsus fuscous, mixed with red ventrally; spine-like scales blood-red always. Abdomen: tergites 1–3 blackish with some reddish scales on tergite 3; tergites 4–7 light yellow-brown; sternites 1+2 whitish, mixed with black; sternite 3 black, basally whitish; sternites 4–7 dark yellow-brown; anal tuft very short and smooth. Forewing: mainly brownish opaque; in place of ATA a long narrow hyaline streak; in PTA a narrow semi-hyaline streak; ETA with three semihyaline cells between M_1 and Cu_1 ; ventral side similar, with costal margin orange scaled; vein Cu_2 weak but present. Hindwing: transparent, outer margin and veins fuscous.

Male genitalia (gen. prep. AK210, Fig. 36). Uncus large, broad triangular, apically with a single pointed tip; tegumen strong, fused to uncus almost throughout, lateral margins conspicuously sclerotized, tuba analis with a distinct ventral sclerotized plate; vinculum short; saccus small; valva well rounded, inner surface with individual short setae, outer surface with long setae near margin; aedaeagus strong, apically with a single small, tooth-like spine; coecum penis well developed.

Diagnosis. The species is unmistakable by the bicolouration of the dorsal side of the abdomen (basally black, distally yellowish brown).

Habitat and bionomics. The specimens were collected in late May in garden land in the area of montane rainforest.

Distribution. At present only known from the type locality in northern Myanmar (Burma) and from northern Vietnam.

Material examined. 2 ♂, N. Vietnam, Lao Cai Prov., Sa Pa, ca 1,500 m, 28. V. 1997, Y. Arita leg. (ZMUN).

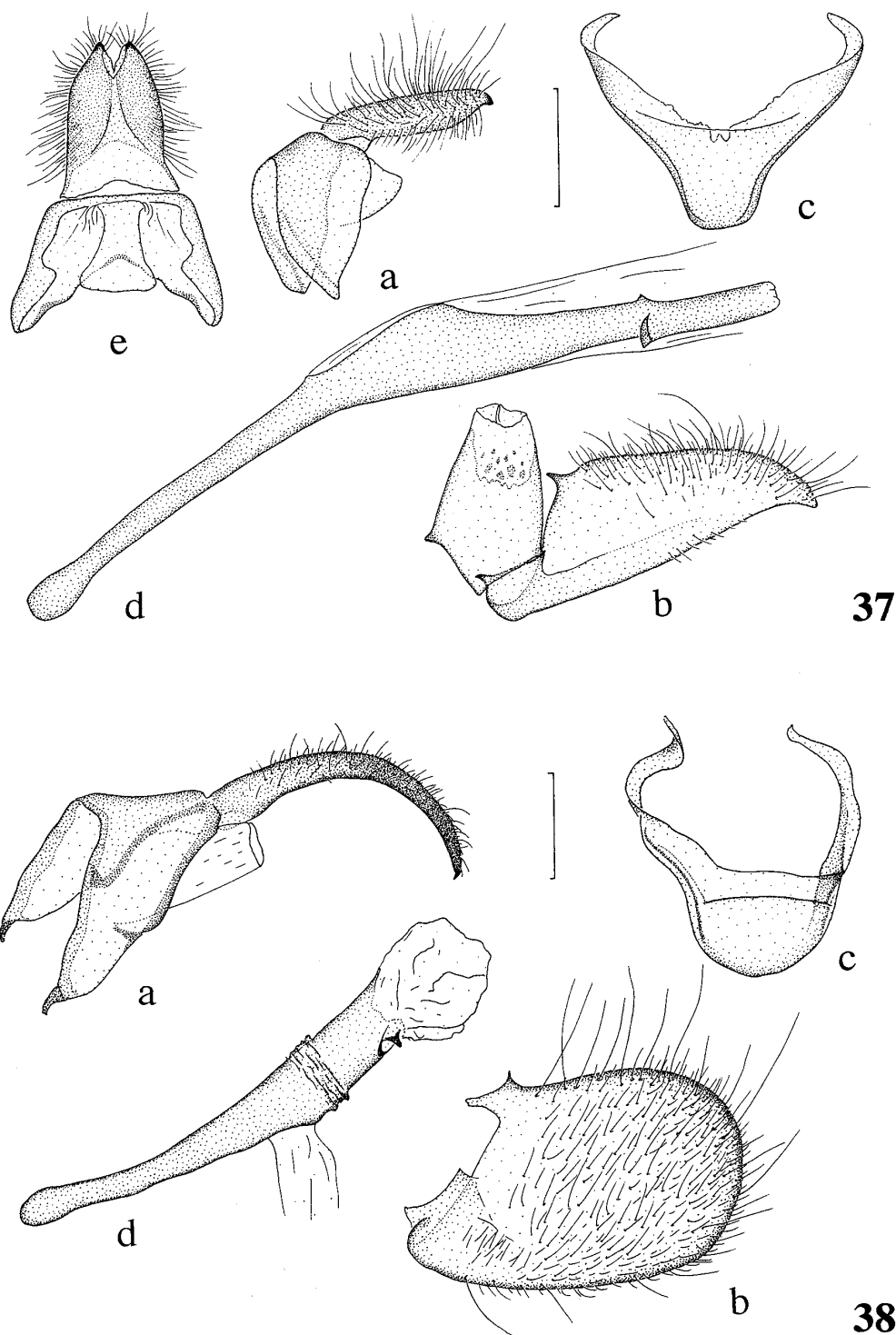
Trichocerota radians Hampson (Figs 14, 15)

Trichocerota radians Hampson, 1919: 116. Type locality: India, Assam, Khasis. Type ♀, in BMNH. Dalla Torre & Strand, 1925: 185; Gaede, 1933: 798; Heppner & Duckworth, 1981: 22.

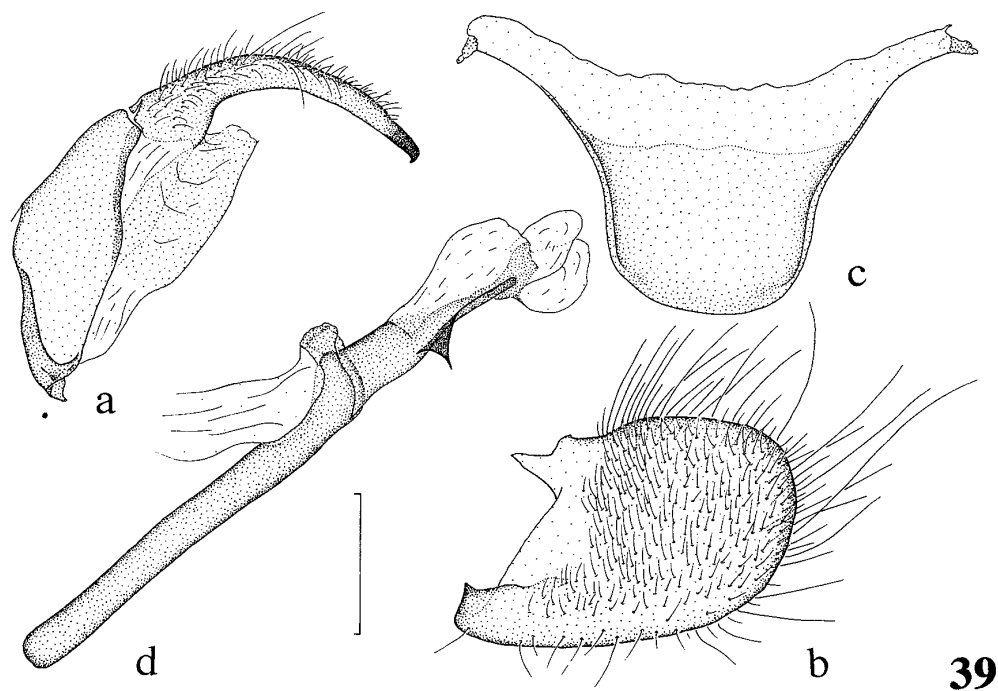
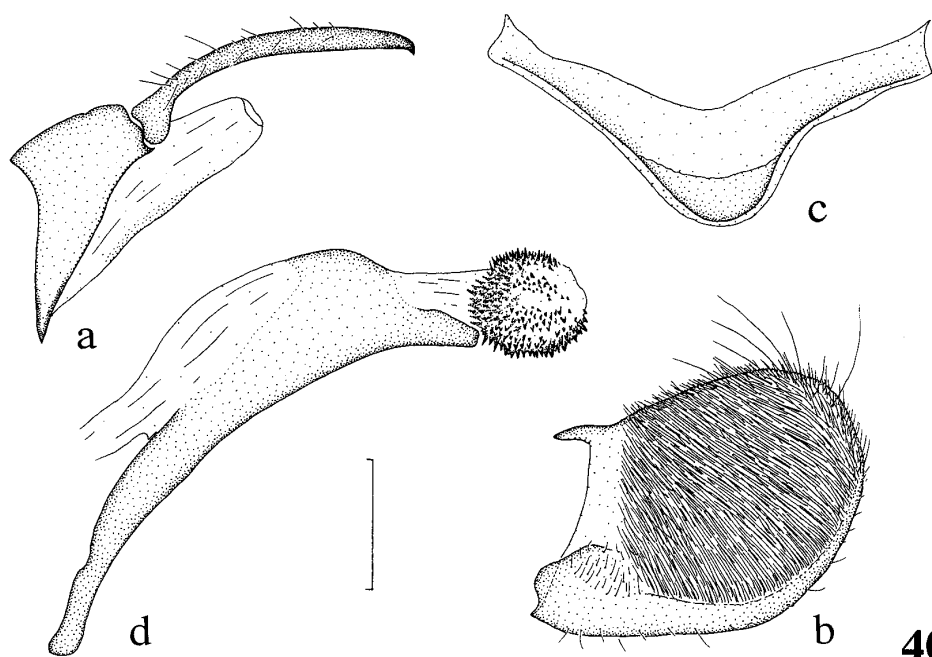
The species was described from a single ♀. It is very characteristic and unique within the genus by the strong ray-like markings of the forewing. We here give a redescription from a ♀ and a ♂ recently collected in northern Vietnam.

Female (Fig. 15). Alar expanse 25.0 mm, forewing length 11.0 mm, body length 12.0 mm, antenna 5.0 mm.

Head: antenna filiform, black, short orange scaled; labial palps smooth-scaled, lemon-yellow, apical and mid joint black laterally; proboscis well developed; frons black; vertex relatively rough-scaled, black; pericephalic scales yellow, dorsally yellow and black. Thorax: dorsally black, yellow submedially and ventrally, with a yellow posterior margin; prothorax with a black streak laterally; patagia yellow in basal half, black in distal half; tegulae scattered



Figs 37–38. Male genitalia. a. Tegumen-uncus complex. b. Valva and juxta. c. Sacculus. d. Aedaeagus. e. Tegumen-uncus complex, ventral view. Scale bars: 0.5 mm. 37. *Trichocerota melli* sp. nov. (paratype, gen. prep. AK179) (ZMUN). 38. *Paradoxecia myrmekomorpha* (Bryk, 1947), comb. nov. (gen. prep. AK222) (CAK).


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Figs 39-40. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedaeagus. Scale bars: 0.5 mm. 39. *Paradoxecia dizona* (Hampson, 1919), comb. nov. (gen. prep. AK215) (ZMUN). 40. *P. tristis* sp. nov. (paratype, gen. prep. AK142) (CHR).

with yellow scales. Legs: neck plate and fore coxa yellow; fore femur, tibia and tarsus orange-yellow; mid coxa yellow mixed with black; mid femur yellow, anterior margin black; mid tibia yellow, mixed with black and orange dorsally; mid tarsus yellow-orange; hind coxa yellow; hind femur yellow, with anterior half black dorsally; hind tibia yellow, black dorsally in basal and distal part; hind tarsus orange with some black scales dorsally. Abdomen: ground colour black, almost completely covered with olive-yellow scales, leaving only tergite 2 and 3 uncovered black submedially; sternites yellow, sternites 3–5 with a black narrow posterior margin; anal tuft smooth olive-yellow, mixed with black dorsally and laterally. Forewing: blackish, in place of ATA a pale yellow streak, which covers the area of discal spot, is divided in three small streaks in place of the cells between M_1 and Cu_1 , and becomes orange-yellow towards termen; costal margin and distal part of anal margin with a narrow orange-yellow streak; veins black, scattered with individual yellow scales; fringes black mixed with orange-yellow scales; ventral side similar but costal margin orange. Hindwing: transparent, fringes dark in forewing; ventral side with costal and outer margin orange.

Male (Fig. 14). Alar expanse 17.5 mm, forewing length 8.0 mm, body length 8.0 mm, antenna 3.8 mm.

In basic coloration similar to female but antenna long bipectinate, ciliate; forewing with basal part of ATA transparent, distal part like in ♀ but more intensively orange scaled; hindwing with outer half densely covered with brownish semi-hyaline scales; anal tuft yellow ventrally, dorsally divided into three small individual tufts, black mixed with yellow.

Diagnosis. By external characters like forewing pattern, this species can not be confused with any other *Tinithinae*.

Habitat and bionomics. The specimens were collected in late May and early June at the edge of submontane to montane rainforest.

Distribution. Known from north-east India and northern Vietnam (new record).

Material examined. 1 ♂, N. Vietnam, Vinh Phu Prov., Tam Dao, 1,230 m, 2. VI. 1997, N. Kanie leg. (ZMUN); 1 ♀, N. Vietnam, Lao Cai Prov., Sa Pa, ca 1,700 m, 26. V. 1997, R. Matsumoto leg. (ZMUN).

***Trichocerota spilogastra* (Le Cerf), comb. rev.**

Tinithia spilogastra Le Cerf, 1916: 11, pl. 377, fig. 3158. Type locality: Haut-Birmanie, Etat de Momeit [Myanmar]. Holotype ♀, in MNHP. Le Cerf, 1917: 370–371; Dalla Torre & Strand, 1925: 183; Gorbunov & Arita, 1995c: 70–71, figs 1, 17.

Trichocerota spilogastra: Hampson, 1919: 117; Gaede, 1933: 799, pl. 94, row i; Heppner & Duckworth, 1981: 22.

The species was recorded from Pahia, Vietnam; figured and redescribed in detail by Gorbunov & Arita (1995c). It is similar to *P. dizona* (Hampson, 1919), and in our opinion (according to external characteristics), not a member of the genus *Tinithia* Walker, 1865 (type species *T. varipes* Walker, 1865) *sensu stricto*, but a representative of the genus *Trichocerota* in the current view. However, the systematic position of both species should be reviewed in a future generic revision.

***Trichocerota melli* sp. nov.** (Figs 16, 17, 37, 50)

Trichocerota brachythyra Hampson, 1919: 118, Zukowsky, 1929: 37 (misidentification).

Description. Holotype ♂ (Fig. 16). Alar expanse 25 mm, forewing length 11.8 mm, body length 13.0 mm (including the anal tuft), antenna 5.0 mm.

Head: antenna black, shortly scaled, short ciliate; labial palps smooth-scaled, long, upcurved, reaching the antennal basis, white, mid joint with a black lateral line, apical joint ventrally and laterally black; frons blackish with leaden grey shine, narrow yellow-white at lateral margin, almost completely hidden by long scales of the vertex; vertex smooth, black; pericephalic scales ventrally and laterally white, dorsally black. **Thorax:** black, with few white scales at prothorax laterally and at metathorax submedially. **Legs:** black, neck plate black, fore coxa with a white patch basally, fore femur with white scales close to tibial joint, tibia yellowish ventrally, tarsus with each tarsomer with white scales in middle part; mid coxa basally white; mid femur at distal end white; mid tibia with some white scales at distal end; tibial spurs very long, long scales at posterior margin; mid tarsus with basal tarsomer with white scales dorsally, remaining tarsomers scattered with individual long orange scales at distal ends; hind coxa white; hind femur white at anterior margin; hind tibia with white scales at distal half; hind tibial spurs relatively short, white; basal tarsomer black, rough-scaled; remaining tarsomers yellow-white, dorsally strongly mixed with black. **Forewing:** completely opaque brownish black with a strong bluish lustre; ventrally with some yellow scales basally; Cu₂ developed. **Hindwing:** transparent, in outer half densely covered with semi-transparent scales. **Abdomen:** black, shining; tergite 3 with deep yellow posterior margin; tergites 5–6 with narrow yellow posterior margins; sternite 2 with some white scales at posterior margin; sternites 6 and 7 with some yellow scales at posterior margins; anal tuft triangular, black, white ventro-medially.

Male genitalia (gen. prep. AK179, Fig. 37). Uncus large, flattened dorso-ventrally, consisting of two apically pointed well sclerotized socii, dorsally with long hair-like setae; tuba analis with a small sclerotized plate ventrally; tegumen short; vinculum well developed, saccus small, blunt ending; valva almost triangular, long, relatively narrow, apically pointed, apex directed towards ventral margin, dorsal half of inner surface sparsely covered with setae of various length; aedaeagus long, bent, subapically with a well sclerotized edge; coecum penis long and narrow, apically rounded.

Female (paratype, Fig. 17). Very similar to ♂, differing only in size (somewhat larger with alar expanse 29 mm) and in the structure of the antenna (filiform, with extremely short cilia ventrally).

Female genitalia (gen. prep. No AK171, Fig. 50). Ovipositor long; papilla anales small; posterior apophysis long, conspicuously longer than anterior pair; 8th tergite without ventral appendix, with weak setae at posterior margin; ostium sclerotized; antrum with a small well sclerotized ring; ductus seminalis emerging close to corpus bursae; corpus bursae with regular transverse folds and a small ill-defined signum.

Variability. Only little variable in size (alar expanse of the males 23–25 mm).

Diagnosis. By the shape of the genitalia and the bluish shine of the forewings, this species is unique among the known Tinithiinae.

Habitat and bionomics. The Vietnamese specimens were collected in early May at the edge

of submontane tropical rainforest. Specimens from China are from end of June.

Distribution. Known from northern Vietnam and south-east China (Guangdong Prov.).

Material examined. Holotype ♂, N. Vietnam, Vinh Phu Prov., Tam Dao, 930 m, 2. V. 1998, T. Hirowatari leg. (ZMUN). Paratypes. 1 ♂, same data as holotype, 7. V. 1998, B. Tanaka leg. (ZMUN); 1 ♂ 1 ♀, Canton (China) [Guangdong Prov.], Westfluss, Ting-Wu-San, 25. VI. 1910, Mell S.G. [leg.]/*Tr. brachythyra* [sic!] [Zukowsky det.]/gen. prep. AK152 (MNHB).

Etymology. This interesting new species is named after the famous entomologist R. Mell, who collected the first specimens, designated as paratypes here.

***Paradoxecia* Hampson**

Paradoxecia Hampson, 1919: 51 (key), 114. Type species: *Aegeria gravis* Walker, 1865, by original designation. Dalla Torre & Strand, 1925: 180; Gaede, 1933: 797; Naumann, 1971: 22, 55; Heppner & Duckworth, 1981: 21; Fletcher & Nye, 1982: 118; Spatenka *et al.*, 1993: 85; Gorbunov & Arita, 1997: 60; Spatenka *et al.*, 1999: 35 (key), 49.

Paranthrenina Bryk, 1947: 106. Type species: *Paranthrenina myrmekomorpha* Bryk, 1947, by monotypy. Naumann, 1971: 22; Heppner & Duckworth, 1981: 24; Fletcher & Nye, 1982: 119; Gorbunov & Arita, 2001 (in press). **Syn. nov.**

The genus *Paradoxecia* was reviewed recently by Gorbunov & Arita (1997). The authors redescribed the genus and gave a key for separating the four known species. We here describe another 4 species in *Paradoxecia* and additionally transfer two species to this genus. It is now possible to add some remarks to the generic characters given by Gorbunov & Arita (1997).

Diagnosis. Labial palps smooth or rough-scaled in basal and mid joint; antenna in ♂ ciliate with cilia located on two low hooks on each antennal segment or long bipectinate and ciliate; proboscis well developed and long or very short; forewings opaque or with very narrow hyaline streak in the place of the ATA (not PTA!); ETA sometimes present but minute; vein Cu₂ usually present; tergite 7 of ♀ smooth-scaled, with more or less developed narrow lateral bunches of long scales.

The genus is closely related and similar to *Trichocerota* Hampson, 1893 but differs by the typically larger size and the venation (Cu₂ typically absent, sometimes present but minute in *Trichocerota*). In ♀ *Paradoxecia* differs from *Trichocerota* by the presence of a lateral extension of the proximal margin of the 8th tergite and by the structure of the antennae which are typically heavily scaled and thickened in the middle part. Since the genus *Trichocerota* is only insufficiently known, we can not exclude that *Paradoxecia* represents only a junior synonym of *Trichocerota*. The differences between *Paradoxecia* and *Paranthrenina* (comp. to Bryk, 1947; Gorbunov & Arita, 2001, in press) are weakly supported. In our opinion the latter name is a junior subjective synonym of *Paradoxecia* (**syn. nov.**). A differential diagnosis for the separation of *Paradoxecia* from other closely related Tinthiinae genera is given by Gorbunov & Arita (1997).

Bionomics. Only one species (*P. pieli* Lieu, 1935) was reared from larvae, which were found in twigs of *Morus* sp., Moraceae (Lieu, 1935).

Distribution. Known from the eastern part of the South Asian mainland (NE India, SE China, Vietnam, Burma) and Taiwan.

***Paradoxecia myrmekomorpha* (Bryk), comb. nov. (Figs 18, 19, 38)**

Paranthrenina myrmekomorpha Bryk, 1947: 106, pl. 1, fig. 9. Type locality: northern Birma [=NE Myanmar], Kambaiti, 6000 Fs. Holotype ♀, (not ♂!) in RMS. Heppner & Duckworth, 1981: 24; Gorbunov & Arita, 2001 (in press).

This species was described from a female holotype, which unfortunately today is in a poor condition, lacking the abdomen. Taking into consideration the original description (Bryk, 1947), a coloured photograph of the original undamaged type specimen, and the detailed description of the remainder of the type specimen given by Gorbunov & Arita (2001, in press), we are convinced that the species is a representative of the genus *Paradoxecia*, and that the specimens taken in the Fan Si Pan Mts, northern Vietnam are conspecific. We here present a detailed redescription of the species based on the material collected recently.

Male (Fig. 18). Alar expanse 24.5–27.0 mm, forewing length 11.0–12.0 mm, body length 11.0–14.0 mm, antenna 6.0–7.0 mm.

Head: antenna black, short bipectinate, long ciliate; labial palps orange with some black scales, apical joint whitish; pericephalic scales white, dorsally orange; frons leaden grey, with some whitish scales laterally, half covered by the vertex; vertex fuscous, with some orange scales laterally. Thorax: fuscous, mesothorax with two narrow orange submedial lines; patagia orange laterally, tegulae mixed with some orange scales. Legs: neck plate fuscous; fore coxa fuscous with some orange scales; fore femur similar with some orange scales distally; fore tibia fuscous, orange-yellow ventrally, with some orange spine-like scales basally and with a strong, short spur distally; fore tarsus black; mid and hind legs very similar, blackish, coxae creamy-white, femora mixed with whitish and orange scales, tibial spurs black; spine-like scales strong, orange. Forewing: brownish, scattered with orange scales between the veins; basally with an orange spot; ETA consisting of two semi-transparent cells between M_2 and Cu_1 ; in place of ATA a very narrow semi-transparent streak, a similar one in place of the PTA almost hidden by loosely scattered orange and brownish scales; ventral side similar but orange scaling more extensive, costal margin orange. Hindwing: transparent, rusty shining; outer margin narrow, blackish. Abdomen: segments 1–3 deep black, 4–7 fuscous; tergite 1 with a narrow orange-white lateral line; tergite 4 anteriorly and tergite 6 posteriorly with strong orange-yellow bands; tergite 7 with some orange-yellow scales latero-posteriorly; sternite 4 dirty-orange with individual white scales anteriorly; sternites 5–7 with narrow dirty-orange posterior margins; sternite 5 mixed with individual orange and white scales; anal tuft fuscous, with some long orange-yellow scales laterally, ventral tip orange-yellow.

Male genitalia (gen. prep. No AK222, Fig. 38). Uncus long, bent, finger-shaped, strongly sclerotized; tegumen well developed, ventral margin well sclerotized; tuba analis small membranous; valva evenly rounded, sparsely clothed with short and long setae; aedaeagus relatively short, not even twice as long as valva, with a single tooth-shaped spine, situated near a small, rounded sclerotized edge; vesica membranous, without cornuti; coecum penis slightly bent; vinculum narrow; sacculus small, rounded.

Female (Fig. 19). Alar expanse 32.0 mm, forewing length 15.0 mm, body length 14.0 mm, antenna 7.0 mm.

Very similar to male but differing as follows: antenna filiform, slightly thickened in middle part; transparent cells between M_2 and Cu_1 more densely covered with semi-transparent to

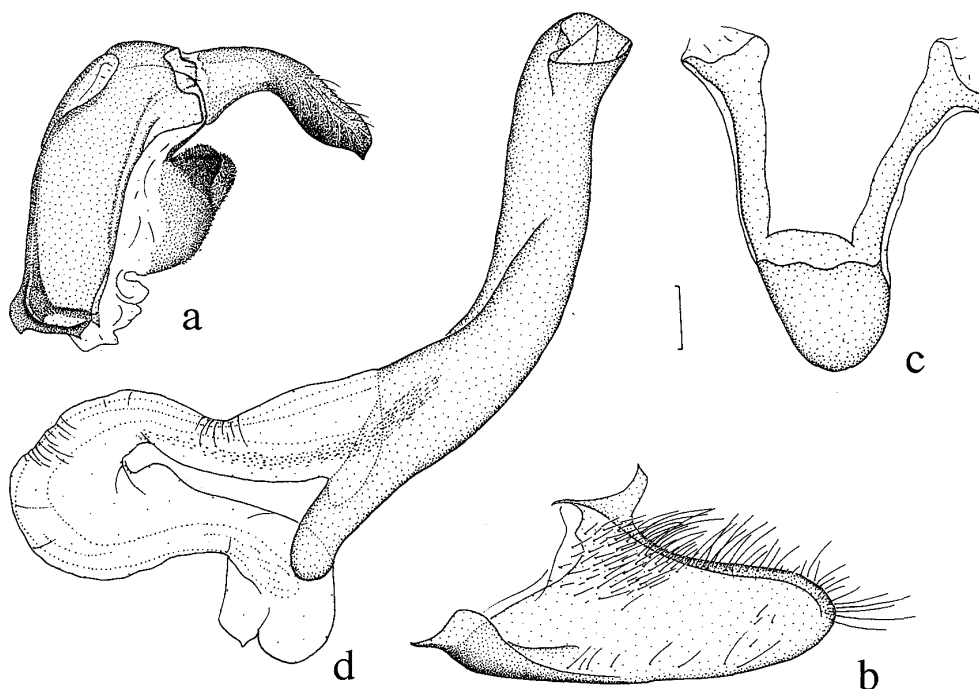


Fig. 41. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedaeagus. Scale bar: 0.5 mm. *Rectala magnifica* sp. nov. (holotype, gen. prep. AK243) (ZMUN).

brownish scales; transparent streak in place of ATA somewhat shorter; hindwing in outer part sparsely covered with semi-transparent scales; anal tuft orange apically; orange scales of the tegulae more prominent.

Variability. Some specimens have a small additional transparent cell between M_1 and M_2 or broader orange-yellow abdominal rings. The female specimen (holotype) from Myanmar (Burma) differs from the female from Vietnam by the somewhat broader orange ring of the abdominal tergite 4.

Diagnosis. By the bicolouration of the background colour of the abdomen (black in basal portion, remaining part brownish) the species is similar to *P. fukiensis* Gorbunov & Arita, 1997. From this species it differs by the maculation of the abdomen (tergite 4 with yellow stripe anteriorly, tergites 5 and 6 with narrow orange stripe posteriorly in *P. fukiensis*) and by the genitalia (distally thickened and with a strong thorn in *P. fukiensis*). It also resembles *P. vietnamica* Gorbunov & Arita, 1997, which easily can be differentiated by the maculation of the abdomen (tergites black, except from a small orange latero-anterior spot on tergite 4 in *P. vietnamica*). From *P. pili* Lieu, 1935 and *P. gravis* (Walker, 1865) the species differs clearly by the distribution and colour of the abdominal bands (comp. to Gorbunov & Arita, 1997). *Trichocrota rufincta* Hampson, 1893 differs from *P. myrmekomorpha* by size (alar expanse about 22 mm), by the appearance of the transparent areas of the wings (clear, not rusty shining), and by the structure of the genitalia.

Habitat and bionomics. The species was collected at the edge of montane subtropical rainforest in the same area like *Caudicornia xanthopimpla* (see above). The male specimens were attracted to artificial pheromones in early afternoon.

Distribution. Known from the type locality in northern Myanmar (Burma) and from

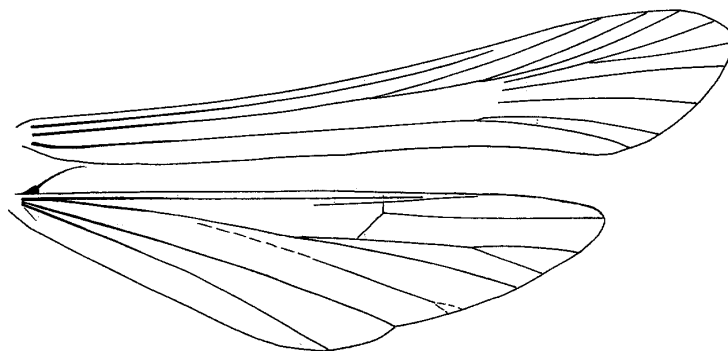


Fig. 42. Venation. Scale bar: 2.0 mm. *Corematosetia naumanni* gen. et sp. nov., holotype.

northern Vietnam (new record).

Material examined. 6 ♂, N. Vietnam, Lao Cai Prov., Fan Si Pan Mts, near Sa Pa, mount. forest, ca 1,950 m, 20–21. VI. 1999, A. Kallies & Y. Arita leg. (CAK); 5 ♂, same data (ZMUN); 1 ♀, N. Vietnam, Deo O Quy Ho, Sa Pa, 30. VI. 1997, H. Kurahashi leg. (ZMUN).

***Paradoxecia vietnamica* Gorbunov & Arita**

Paradoxecia vietnamica Gorbunov & Arita, 1997: 62–65, figs 4, 8. Type locality: Vietnam, Pahia. Type: ♀, in MHNG.

Up to now, the species is known only from the holotype specimen.

***Paradoxecia luteocincta* sp. nov. (Fig. 20)**

Description. Holotype ♀ (Fig. 20). Alar expanse 28.5 mm, forewing length 13.2 mm, body length 14.0 mm, antenna 6.0 mm.

Head: antenna black, filiform with minute cilia, thickened and densely scaled in middle part; labial palps rough, mid joint white, dorsally dirty-yellow, apical joint smooth, blackish with some yellow and white scales; proboscis medium sized; frons black leaden shining, very smooth-scaled; vertex black, smooth-scaled, scales covering half the frons; pericephalic scales white. Thorax: patagia black-brown shining, with some white scales baso-laterally; metathorax submedially with two patches of yellow narrow scales, otherwise black. Legs: black; neck plate yellow with some black scales; fore coxa yellow in basal 2/3 externally; fore femur mixed with yellow scales, especially distally; fore tibia yellow, ventrally with some black scales, in middle part and at distal end with narrow spine-like brown-red scales; fore tarsus with each tarsomer yellow mixed ventrally; mid coxa white; mid femur yellow, at lateral side with black margins; mid tibia black, dorsal and ventral edge yellow with yellow-brown spine-like scales in the middle and at distal end; mid tarsus black, basal tarsomer with spine-like scales at distal end; spurs yellow-white ventrally; hind coxa white; hind femur white basally and at posterior margin; hind tibia black in basal half, yellow ventrally and interiorly; distal half yellow, spurs yellow; spine-like scales yellow; hind tarsus yellow with basal tarsomer black dorsally. Abdomen: black; tergite 4 yellow except from narrow black posterior margin; tergite 6 with posterior half yellow; anal tuft smooth-scaled, laterally with

a bunch of long narrow scales at each side; sternites 1+2 black mixed with yellow-white; sternite 3 black with yellow white anteriorly; sternite 4 pale yellow; sternite 5 pale yellow mixed with some black scales; sternites 6-7 black mixed with few yellow scales. Forewing: deep brown, with a very narrow transparent streak in place of the ETA and a very small semi-transparent patch between M_2 and Cu_1 ; costal margin deep yellow in basal 4/5 ventrally. Hindwing: veins brown, external half of wing covered with brownish semi-transparent scales, outer margin brown, broadened towards apex, ventral side similar with veins and outer margin yellowish in basal part.

Genitalia. Not examined.

Diagnosis. Due to the two broad bright yellow abdominal bands, the new species can be easily separated from all congeners.

Habitat and bionomics. The type specimen was collected in late April at the edge of lowland tropical rainforest.

Distribution. Only known from the type locality.

Material examined. Holotype ♀, N Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 28. IV. 1998, Y. Arita leg. (ZMUN).

***Paradoxecia karubei* sp. nov.** (Figs 21, 51)

Description. Holotype ♀ (Fig. 21, paratype). Alar expanse 25.5 mm, forewing length 12.0 mm, body length 13.5 mm, antenna 6.5 mm.

Head: antenna black, thickened in middle part, densely scaled; labial palps white, yellowish apically, with some black and yellow scales dorsally; frons and vertex black shining; pericephalic scales white, dorsally mixed with black. Thorax: black; with a small yellow ventro-lateral patch; patagia black, lemon-yellow laterally; tegulae black; metathorax black with individual yellow scales and yellow hair-like scales dorso-laterally. Legs: black; neck plate yellowish white; fore coxa partly white basally; fore femur with individual yellowish scales distally; fore tibia yellowish ventrally, spine-like scales brown-yellow; fore tarsus with individual yellow scales; mid coxa white distally; mid femur with a white-yellow spot distally; mid tibia with individual yellow scales, spine-like scales brown-yellow; mid tarsus with short orange-brown spine-like scales; hind coxa white in distal half; hind femur with individual white scales distally; hind tibia black in basal half externally, yellow in distal half; internally yellow, tibial spurs black and white-yellow; spine-like scales yellowish; hind tarsus yellowish. Forewing: dark brown, opaque except from a hyaline streak in place of the ATA; ventral side similar, costal margin yellow. Hindwing: transparent, veins dark brown; outer margin brown, narrow in anal part, somewhat broader towards apex. Abdomen: tergites black, tergite 4 with a broad dirty orange-yellow band anteriorly; tergites 5-6 with narrow orange-yellow stripes at posterior margins; tergite 7 and anal tuft black with a small and narrow tuft of orange-yellow scales laterally; sternites black; sternite 3 dirty-white anteriorly; sternite 4 broad dirty-white anteriorly.

Female genitalia (gen. prep. No AK186, Fig. 51). Ovipositor short; papilla anales broad, clothed with very short setae; posterior and anterior apophysis of about equal length; 8th tergite weakly sclerotized, relatively narrow, with a short spine at base of apophysis; antrum with a narrow sclerotization near ostium; ductus bursae long; corpus bursae small, without signa.

Variability. Tergites 1–2 in a paratype specimen with whitish yellow posterior margins.

Diagnosis. By the markings of the abdomen and the morphology of the genitalia, the species can not be confused with any other species.

Habitat and bionomics. The holotype was collected in late April at the edge of lowland tropical rainforest.

Distribution. Known only from two localities in northern Vietnam.

Material examined. Holotype ♀, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 28. IV. 1998, H. Riefenstahl & B. Wagenblass leg. (CHR). Paratype. 1 ♀, N Vietnam, Cao Bang, Pia Dao Mt, 26. V. 1998, H. Karube leg. (ZMUN).

Etymology. The species is dedicated to Mr H. Karube (Kanagawa Prefectural Museum of Natural History, Odawara, Japan), a specialist in Odonata, who collected one of the two known specimens.

***Paradoxecia dizona* (Hampson), **comb. nov.** (Figs 22, 23, 39, 52)**

Trichocerota dizona Hampson, 1919: 117. Type locality: India, Assam, Khasis. Type: ♀, in BMNH. Dalla Torre & Strand, 1925: 184; Gaede, 1933: 799, pl. 94, row i; Heppner & Duckworth, 1981: 22.

The species was described from a ♀ collected in north-east India. We here give the first record of the species from Vietnam and describe the ♂ for the first time.

Male (Fig. 22). Alar expanse 16.5–19.5 mm, forewing length 7.0–9.0 mm, body length 7.0–9.0 mm, antenna 4.5–5.0 mm.

Head: antenna short bipectinate, long ciliate; labial palps long, slightly upcurved, white, mid joint with some brown scales laterally; proboscis well developed; frons black, leaden grey shining, covered with leaden grey shining scaled vertex; pericephalic scales white, black dorsally. Thorax: black with some white hair-like scales at metathorax submedially. Legs: black; fore coxa white basally; fore femur with yellow inner half; fore tibia yellow ventrally; mid coxa with some white distally; mid femur white ventro-distally; mid tibia white ventro-basally; spurs white ventrally; spine-like scales brownish; mid tarsus uniformly black; hind coxa white; hind femur with white posterior margin; hind tibia in distal half white ventrally; basal hind tarsomer white internally, apical two tarsomers white throughout; neck plate white with some black scales. Abdomen: black; tergite 4 yellow in anterior half; tergites 6–7 yellow in posterior half; sternite 4 white in anterior half; anal tuft smooth-scaled. Forewing: dark brown with a narrow semihyaline streak in place of the ATA and between M_3 and Cu_1 . Hindwing: transparent, with a narrow black margin.

Male genitalia (gen. prep. No AK215, Fig. 39). Uncus bent, finger shaped, apically pointed; valva scattered with hair-like setae, saccus large; aedaeagus straight, with a single strong, well sclerotized spine subapically; coecum penis strong, relatively narrow; vesica without cornuti.

Female (Fig. 23). Alar expanse 24.5 mm, forewing length 11.0 mm, body length 9.8 mm, antenna 5.5 mm.

Similar to ♂ but antenna simple, thickened by heavy scaling, especially in the middle part, abdominal tergite 4 with a broad anterior orange-yellow band; tergite 6 with a broad orange-yellow band at posterior margin; sternites 4–5 each with a broad white anterior band; sternite 6 with some white scales at distal margin; anal tuft with few white scales.

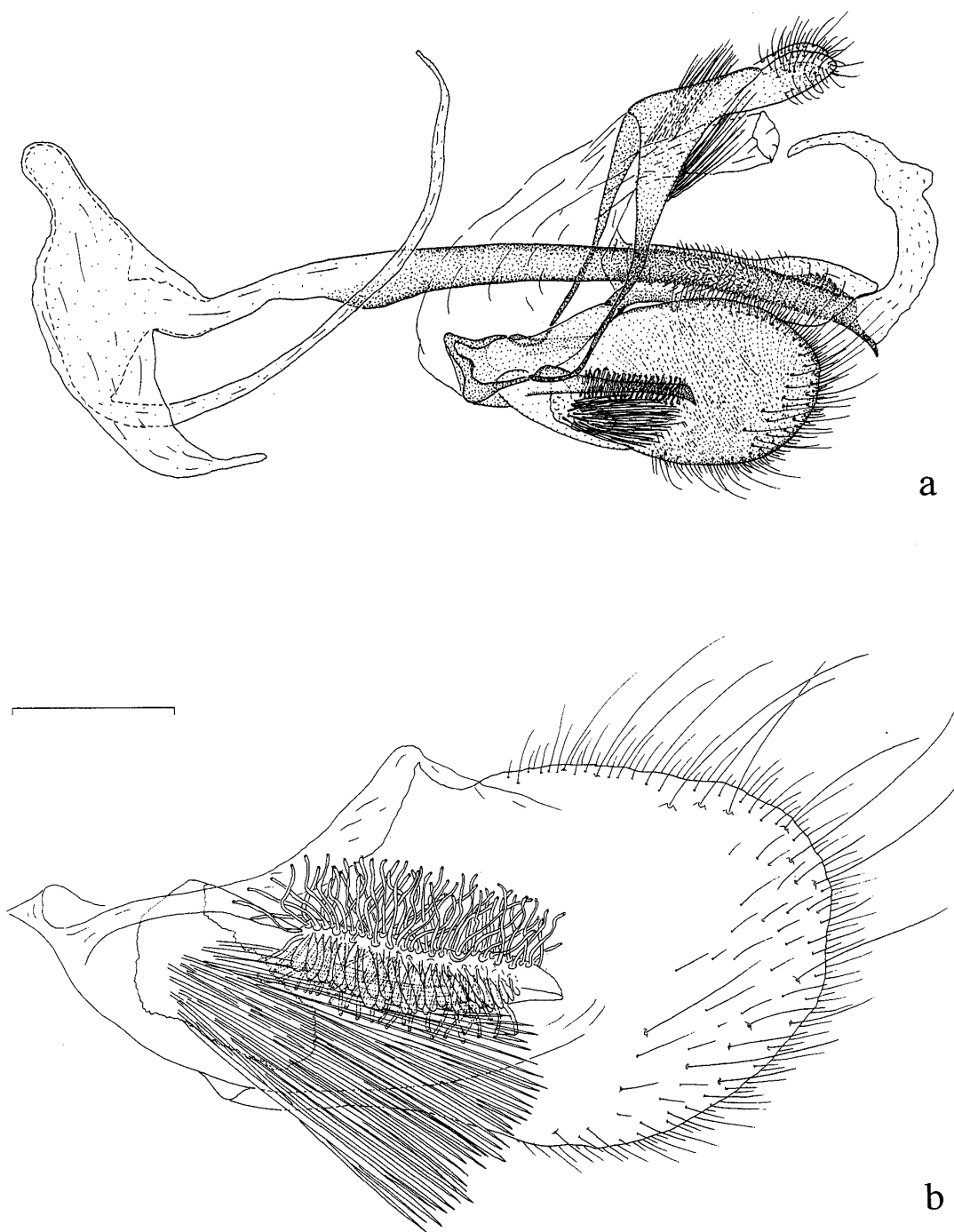


Fig. 43. Male genitalia. Scale bars: 0.5 mm. *Corematosetia naumanni* gen. et sp. nov. (holotype, gen. prep. AK181) (ZMUN). a. lateral view, aedeagus *in situ*, right valva removed. b. left valva, outer surface.

Female genitalia (gen. prep. No AK189, Fig. 52). Ovipositor short; papilla anales large; posterior apophysis shorter than anterior pair; 8th tergite with strong setae at posterior margin, with a short spine at the base of the apophysis; ostium membranous, broad; antrum broad, irregularly folded, partly sclerotized; corpus bursae with two small signa.

Variability. The second known ♀ is somewhat smaller, has more pure yellow bands in

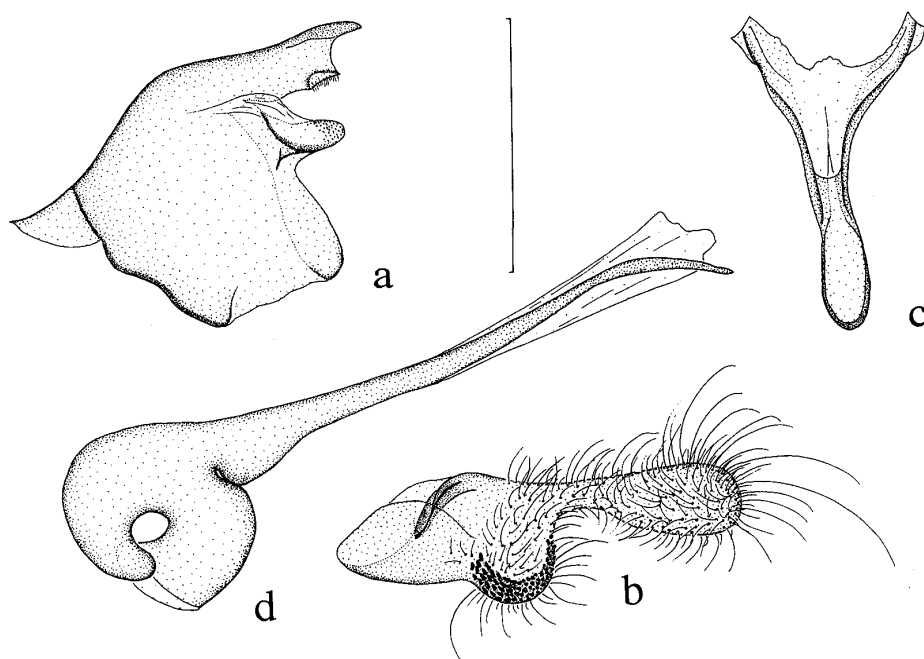


Fig. 44. Male genitalia. a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedaeagus. Scale bars: 0.5 mm. *Similipepsis helicellus* sp. nov. (paratype, gen. prep. AK182) (ZMUN).

tergites 4 and 6 and only sternite 4 bears the white band. However, there were no differences in the genitalia observed.

Diagnosis. By the small size and the distribution of the yellow bands on the abdominal tergites, this species can not be confused with any other named species of the genus. However, a similar species was found at the edge of lowland rainforest of the Cuc Phuong National Park. It differs in details of the forewing (hyaline streak in M_3 - Cu_1 larger, an additional very small streak in M_2 - M_3) and in the shape of the aedaeagus.

Habitat and bionomics. The species was found at the edges of a submontane forest between 800 and 1,100 m in early May to beginning of June.

Distribution. Until now, found in Assam, north-east India, and northern Vietnam (new record).

Material examined. 2 ♂, N. Vietnam, Vinh Phu Prov., Tam Dao, 1,100 m, 2. VI. 1997, Y. Arita leg. (ZMUN); 1 ♀, same data, 930 m, 7. V. 1998, T. Hirowatari leg. (ZMUN); 1 ♀, Vietnam, Tam Dao, 21°28'N, 105°38'E, 800-1,100 m, 19. V-13. VI. 1995, Malicky leg. (CAK).

***Paradoxecia tristis* sp. nov.** (Figs 24, 25, 40, 53)

Description. Holotype ♂ (Fig. 24). Alar expanse 28.5 mm, forewing length 13.2 mm, body length 14.0 mm, antenna 6.0 mm.

Head: labial palps short, upcurved, rough-scaled, apical joint smooth, basal joint black, middle and apical joint white, with individual black scales; frons hidden by smooth black scales of vertex, white laterally; pericephalic scales black dorsally, white ventrally and laterally; antenna long bipectinate, ciliate, dorsally black with individual white scales; scape

black, white latero-ventrally. Thorax: black, patagia with individual yellow scales apically and at ventral margin. Legs: mainly black; mid and hind coxae white; mid femur with a yellow spot at posterior margin apically; hind femur with posterior margin yellow throughout; spurs of hind tibia whitish scaled dorsally; mid and hind tarsi dirty-yellow ventrally. Abdomen: black, tergites 2 and 4 with individual white to yellow scales at posterior margins laterally; sternite 4 dirty-white to yellow at posterior margin; individual yellow scales in anal tuft. Forewing: blackish brown, with a weak purple lustre; distal of the cross vein less densely scaled; ventral side similar but costal margin yellow; fringes brown. Hindwing: transparent rusty, veins brownish, near outer margin and along veins scattered with brown scales; fringes brownish; basally near anal margin with a short snow-white scaled crista; ventrally similar but without crista.

Male genitalia (gen. prep. No AK142, Fig. 40). Uncus long, straight, finger shaped, apically pointed; valva evenly rounded, densely covered with fine setae; saccus small; aedaeagus bent, coecum penis long, relatively narrow; vesica ball-shaped, with numerous small spines.

Female (paratype, Fig. 25) Alar expanse 32.5 mm, forewing length 14.5 mm, body length 15.5 mm, antenna 6.5 mm.

Similar to male but antenna unipectinate, ciliate, scaled; abdominal tergite 2 with narrow yellow-white spot posterior-laterally; sternite 4 with whitish dirty scales posterior-medially; legs with hind femur white basally, with a white spot at distal end, hind tibia with a white spot near the mid spurs; mid spurs long, white at posterior side; hindwing with dark scaling more extensive, especially between M_1 - M_2 , Cu_1 - Cu_2 , and A_1 - A_2 .

Female genitalia (gen. prep. No AK209, Fig. 53). Ovipositor short; papilla anales broad; posterior apophysis longer than anterior pair; 8th tergite well sclerotized, with a distinct ventral appendix and long setae at posterior margin; antrum consisting of a broad, short, well sclerotized part posterior of ductus seminalis and a longer less sclerotized anterior part; corpus bursae with two strong tooth-shaped signa; ostium membranous.

Diagnosis. By the colour of the abdomen (nearly without markings), the long bipectination of the male antennae, and the shape of the aedaeagus of the male genitalia, the new species can be separated easily from all Oriental Tinthiinae species.

Habitat and bionomics. The type specimens were collected at the edge of lowland tropical rainforest and in the lowland garden area from late April to late June.

Distribution. Known only from two localities in northern Vietnam.

Material examined. Holotype ♂, Viet Nam, Prov. Ha Noi, Ha Noi City, 12. V. 1998, H. Riefenstahl & B. Wagenblass leg. (CHR). Paratypes. 1 ♂, same data as holotype (CHR); 1 ♀, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 26. IV. 1998, Y. Arita leg. (ZMUN); 1 ♂, same data, 28-30. VI. 1999, A. Kallies leg. (CAK).

***Rectala* Bryk**

Rectala Bryk, 1947: 103. Type species: *Rectala asyiformis* Bryk, 1947, by original designation. Naumann, 1971: 24, 58; Heppner & Duckworth, 1981: 21; Fletcher & Nye, 1982: 141; Spatenka *et al.*, 1993: 85; Spatenka *et al.*, 1999: 50-51; Gorbunov & Arita, 2001 (in press).

The genus was described from a single species from China, Prov. Kiangsu [=Prov. Jiangsu] and further characterized by Naumann (1971) and Gorbunov & Arita (2001, in press). Up

to now it was known only from two female specimens of the type species, *Rectala asyiformis* Bryk, 1947. Unlike Naumann (1971) and Spatenka *et al.* (1999), who erroneously quoted the absence of a separate vein R_5 , the presence of only two medial veins, and the absence of Cu_2 in the forewing of *Rectala asyiformis*, Gorbunov & Arita (2001, in press) have found the veins R_1 – R_5 and M_1 – M_3 to be present, separate and well-developed in this species. Also, Cu_2 was found to be present but minute. This situation could be confirmed by the examination of the second known species which is described below. The description and figure of the wing venation of *Rectala*, given by Naumann (1971) and Spatenka *et al.* (1999) is incorrect. There is no doubt about the placement of the genus in the tribe Tinithiini in a close relationship to the genus *Paradoxecia*.

We here further characterize the genus on the basis of both male and female specimens, and additionally describe *Rectala magnifica* sp. nov. as the second species in the genus.

Diagnosis. The largest known Tinithiinae with alar expanses of 35–45 mm. The genus *Rectala* is closest to *Paradoxecia*, but can be distinguished by size and the structure of the labial palps (longer and upcurved in *Paradoxecia*). More importantly, *Rectala* can be separated by the structure of genitalia: in males the gnathos is large, well-sclerotized (mainly membranous in *Paradoxecia*), uncus strong, relatively short (long, apically pointed in *Paradoxecia*), valva elongated, apically narrowed, only partly covered with setae (rounded, evenly clothed with setae in *Paradoxecia*), aedaeagus very strong, without distinct sclerotizations apically (with distinct cornuti or well-sclerotized hooks apically in *Paradoxecia*); in females the lamella postevaginalis is narrow (broad in *Paradoxecia*), and ductus bursae anteriorly well sclerotized, right angled bent (not sclerotized and straight in *Paradoxecia*).

Bionomics. Unknown.

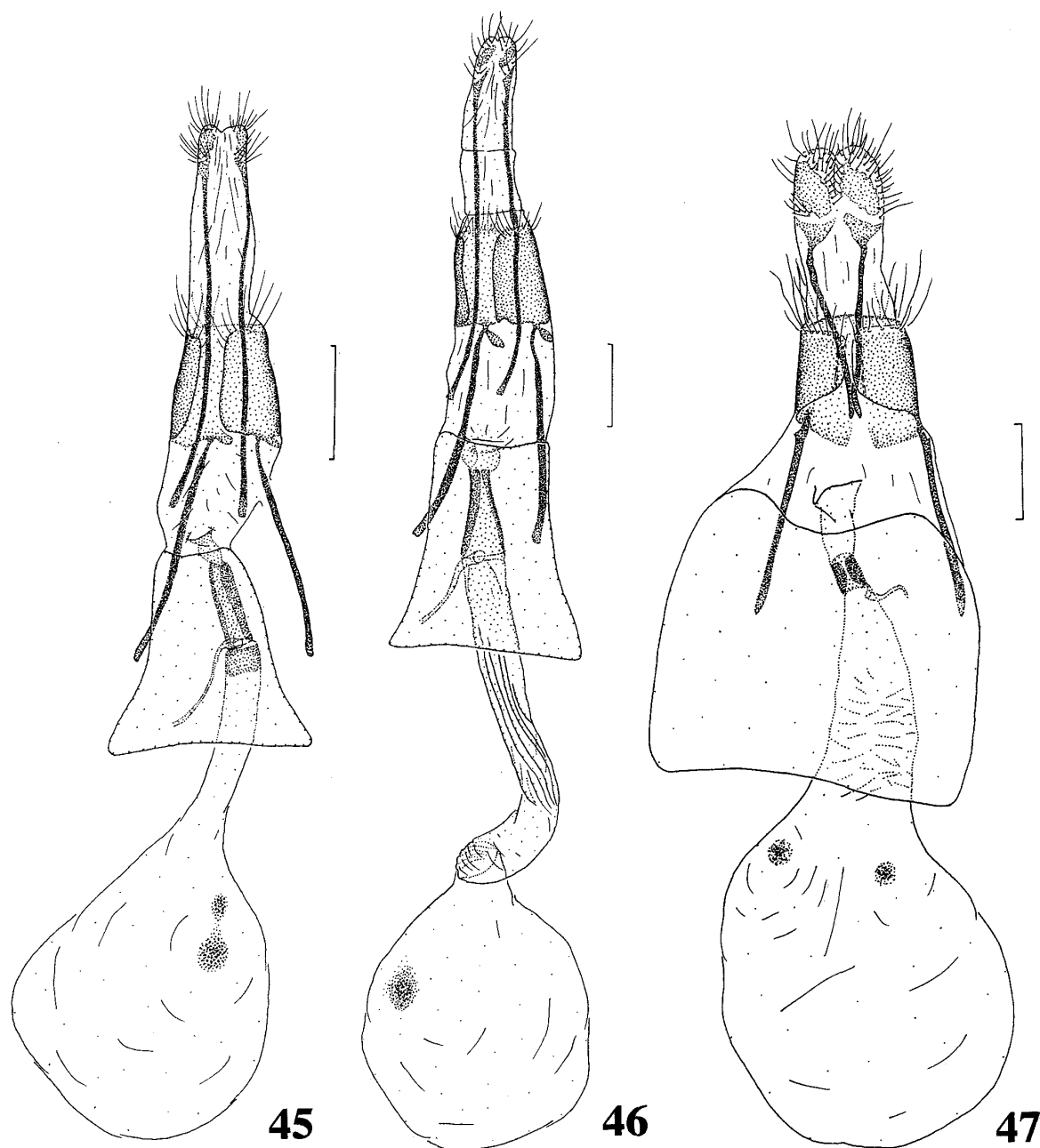
Distribution. Known only from south-east China and northern Vietnam.

Remarks. The presence of a well-developed gnathos in the male genitalia is interesting from the phylogenetic point of view. It suggests that the absence of such a structure in other Tinithiinae is due to a secondary loss and could therefore be interpreted as the apomorphic state.

***Rectala magnifica* sp. nov.** (Figs 26, 27, 41, 54)

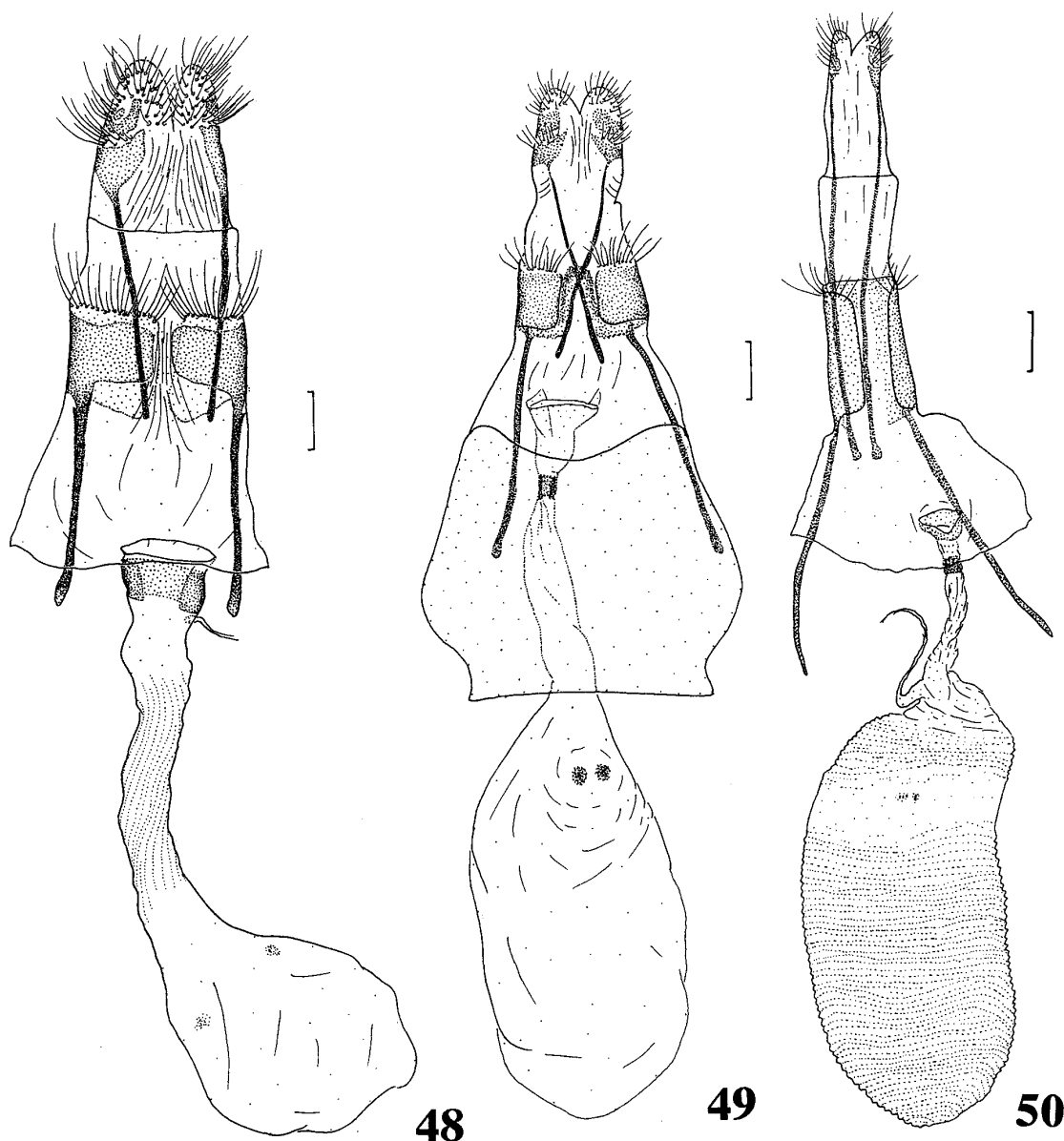
Description. Holotype ♂ (Fig. 26). Alar expanse 44.0 mm, forewing length 20.0 mm, body length 23.0 mm, antenna 9.0 mm.

Head: antenna black, long ciliate, dorsally strongly scaled except from the apical portion, labial palps short, straight, semi rough-scaled, dirty-orange; proboscis well-developed, frons smooth-scaled, grey in middle part, dirty-orange laterally; pericephalic scales orange ventrally, bright white laterally, orange to white dorsally. **Thorax:** smooth scaled, dorsally grey, in posterior part strongly mixed with orange scales, ventrally black; patagia orange, proximally mixed with grey scales; tegulae proximally grey, otherwise orange, apex with an admixture of grey and orange hair-like scales; metathorax black. **Legs:** neck plate black, fore coxa orange-yellow to deep orange; fore femur black, mixed with orange scales; fore tibia black, ventrally with broad dirty-orange scales, dorsally with narrow reddish scales; fore tarsus black, ventrally with dirty-orange scales; mid coxa and mid femur to that of fore leg; mid tibia black, ventrally mixed with dirty-yellow scales, dorsally in proximal part with a large tuft of narrow orange-red scales and a smaller such tuft at the distal end; spurs black; mid tarsus black, the basal two tarsomeres with tufts of narrow orange-red scales apically; hind leg



Figs 45–47. Female genitalia. Scale bars: 0.5 mm. 45. *Ceratocorema hyalina* sp. nov. (paratype, gen. prep. AK178) (ZMUN). 46. *C. yoshiyasui* sp. nov. (paratype, gen. prep. AK175) (ZMUN). 47. *Paranthrenopsis flaviventris* sp. nov. (paratype, gen. prep. AK176) (ZMUN).

similar to mid leg. Forewing: opaque almost throughout, reddish brown, along costa blackish brown, with two semi-transparent cells between M_2 – M_3 and M_3 – Cu_1 ; ventral side similar but more light. Hindwing: transparent, yellowish rusty shining; veins blackish brown; along Cu_1 and Cu_2 narrowly, along A_1 and A_2 broadly scaled; outer margin narrow blackish brown, broader in anal area; fringes fuscous. Abdomen: tergite 1 black, laterally yellow; tergites 2–5 golden-yellow; tergites 6–7 black; anal tuft small, relatively narrow and smooth, of an admixture of black and yellow scales; sternites black; sternite 2 with a yellow spot medially; sternite 3 yellow in posterior half; sternite 5 with some dirty-orange scales at



Figs 48-50. Female genitalia. Scale bars: 0.5 mm. 48. *Caudicornia tonkinensis* sp. nov. (paratype, gen. prep. AK180) (ZMUN). 49. *Entrichella tricolor* sp. nov. (paratype, gen. prep. AK193) (ZMUN). 50. *Trichocerota melli* sp. nov. (paratype, gen. prep. AK171) (ZMHB).

posterior margin.

Male genitalia (holotype, gen. prep. No AK243, Fig. 41). Uncus finger shaped, broad, strong, well sclerotized, apically pointed, dorsally with hair-like setae; tegumen relatively narrow; gnathos well sclerotized and prominent, heart-shaped from ventral view; saccus small, rounded; vinculum long, basally broadened; juxta small membranous, sclerotized only ventrally; valva long, distally narrowed, apex rounded, inner surface in dorso-basal portion and outer surface near apex with hair-like setae; aedaeagus long and strong, bent in middle part, without distinct cornuti, coecum penis short.

Female (paratype, Fig. 27). Alar expanse 44.0 mm, forewing length 20.0 mm, body length 19.0 mm, antenna 8.5 mm.

Similar to male, but somewhat heavier built, antenna filiform, but strongly scaled dorsally, especially at about 3/4 of length; transparent cells of forewing less developed, ventral side of forewing more yellowish.

Female genitalia (paratype, gen. prep. No AK242, Fig. 54). Papilla anales small with short setae; apophysis posterior conspicuously longer than the anterior pair; intersegmental membrane with a small triangular bag-like formation near base of each of the anterior apophysis; 8th tergite narrow, strongly sclerotized, with short individual setae, longer setae at posterior margin; antrum broad, well sclerotized; ductus bursae in posterior part sclerotized and right-angled bent two times, opening continuously into corpus bursae; ductus seminalis branching between antrum and sclerotized part of ductus bursae; corpus bursae without signa.

Diagnosis. The new species can not be confused with any other Tinthiinae.

Habitat and bionomics. The type specimens were collected in secondary tropical forest or at the edge of submontane tropical rainforest respectively in late April, early May, and late September, indicating two generations.

Distribution. Known only from two localities in northern Vietnam.

Material examined. Holotype ♂ (Fig. 26), N. Vietnam, Vinh Phu Prov., Tam Dao, 930 m, 1. V. 2000, Y. Arita leg. (ZMUN). Paratypes. 1 ♀ (Fig. 27), N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 370 m, 29. IV. 1998, Y. Arita leg. (ZMUN); 1 ♀, same locality, 10. IX. 1998, M. Ikeda leg. (CMI).

Tribe Pennisetiini Naumann, 1971

Corematosetia gen. nov.

Type species: *Corematosetia naumanni* sp. nov., by present designation.

Description. Head covered with very tight appressed scales, especially the frons; proboscis well developed; labial palps long and upcurved, apical joint about as long as mid joint, smooth-scaled; basal and mid joint with long tufted scales; ocellus large; antenna scaled, each segment with a single very short and broad processus with a row of short cilia. Thorax and legs generally smooth-scaled with short tile-like scales; in the middle of the mid and hind femora and at tibial spurs tufts of long and narrow scales; tibial spurs long, especially of the mid leg. Abdomen with segments 3–4 laterally depressed; generally smooth-scaled with short tile-like scales; tergites 5–7 rough-scaled; anal tuft broad and short.

Venation (Fig. 42). Similar to *Pennisetia* Dehne, 1850: in forewing vein R_4/R_5 stalked, M_2 and M_3 fused; in hindwing M_2 arising from upper part of the cross vein, M_3 and Cu_1 stalked; A_1 developed; A_2 and A_3 fused. An additional degenerated and probably nonfunctional vein arising from the base of Cu_2 is well marked by a row of scales. This reduced vein is also present in *Pennisetia*, but more difficult to recognize.

Male Genitalia (Fig. 43). Aedaeagus long and narrow, apically with a small hook of minute tooth-like spines, vesica without cornuti, without coecum penis; valva oval rounded, inner surface with fine hair-like setae, outer surface with an unusual and specialized formation which consists of a sclerotized crista covered on both sides with long and narrow tubes (glandular exits?), ventral side additionally with a row of weakly sclerotized scale-like setae; crista basally fused to an extensible membranous sac, which is covered with long and narrow

scales (coremata); uncus relatively large, with a pair of hairy socii apically; tegumen small, laterally with a bunch of long and narrow scales; saccus small and broad; juxta large, apical part tubular, ventrally and dorsally with numerous short setae.

Diagnosis. In *Pennisetia* the antennae are bipectinate (each joint with a single processus only in *Corematosetia* gen. nov.); the frons is rough-scaled and somewhat protruded (smooth-scaled in *Corematosetia* gen. nov.); the thorax, legs and abdomen are generally more rough and covered with long and narrow scales (smooth-scaled, with short tile-like scales in *Corematosetia* gen. nov.). The male genitalia are highly specialized in *Corematosetia* gen. nov.; it is the only known genus of Sesiidae with coremata present in the genitalia.

Relationship. The genus *Corematosetia* nov. represents the sister-group of the genus *Pennisetia*. It is characterized by the clearly apomorphic specialization of the scent organ of the valva, which is not found in *Pennisetia* or any other sesiid genera. Additionally, the scaling found on the head and abdomen is of an advanced type. The genus *Pennisetia* itself is characterized by the apomorphic state of the valva (with a well developed apex) and the distribution of setae on its inner surface (with a bare spot subbasally).

Within the tribe, both genera form a monophyletic group characterized by the setaceous formation of the dorsal wall of the juxta, which is not found in other Pennisetiini or Tinithiinae.

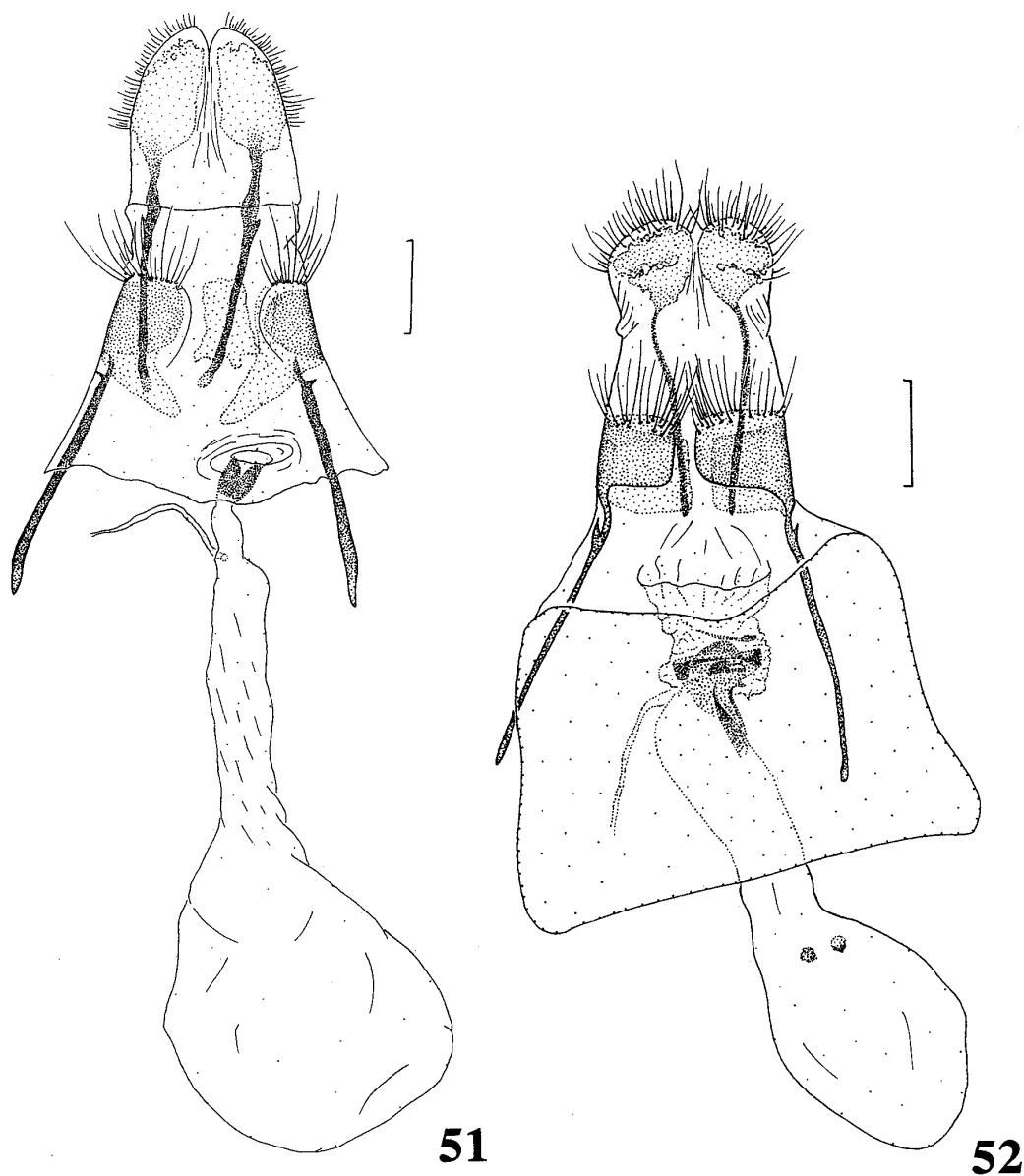
***Corematosetia naumanni* sp. nov.** (Figs 28, 42, 43)

Description. Holotype ♂ (Fig. 28). Alar expanse 25 mm, forewing length 11.8 mm, body length 13.0 mm, antenna 5.0 mm.

Head: antenna black, scape white laterally; labial palps black, mid joint with only few white scales distally, apical joint with ventral side white; frons leaden grey shining, with a narrow white lateral line; vertex black; pericephalic scales orange-yellow dorsally, white and black mixed laterally. **Thorax:** black; tegulae with a very narrow orange-yellow inner margin and few orange-yellow scales subapically; a patch of white scales ventro-laterally; metathorax black, dorso-laterally with some black and whitish hair-like scales. **Legs:** black; neck plate greyish black; fore coxa and fore femur at their common joint creme-white, fore tibia and tarsus with some white scales ventrally; mid coxa cream-white; scale tufts at mid femur mixed with individual yellow scales; tibial spurs black; tarsomers of mid tarsus whitish ventrally, basal tarsomer only in distal part; hind coxa cream-white, black basally; hind femur basally cream-white; hind tibia and hind tarsus white at ventral and medial side. **Abdomen:** black; tergite 4 with a broad orange anterior margin, tergites 5–7 rough-scaled, 5 with a broad orange posterior margin, tergites 6–7 mixed with individual white hair-like scales; sternite 4 with anterior half white, sternite 5 with some individual white scales in anterior part and at posterior margin, sternite 6 with individual white scales; anal tuft black, short. **Forewing:** blackish brown opaque almost throughout; ETA only marked by low density scaling in cell between M_2 and Cu_1 , costal margin with a narrow yellow edge. **Hindwing:** hyaline, outer half densely covered with semihyaline brownish scales, veins brownish, densely covered with brownish scales, outer margin blackish brown, only slightly narrower than length of fringes, along A_1 a long narrow extension of the outer margin into the wing; discal spot marked only by some scales.

Male genitalia (gen. prep. No AK181, Fig. 43). Compare to generic diagnosis.

Habitat and bionomics. The type specimen was collected in early May at the edge of



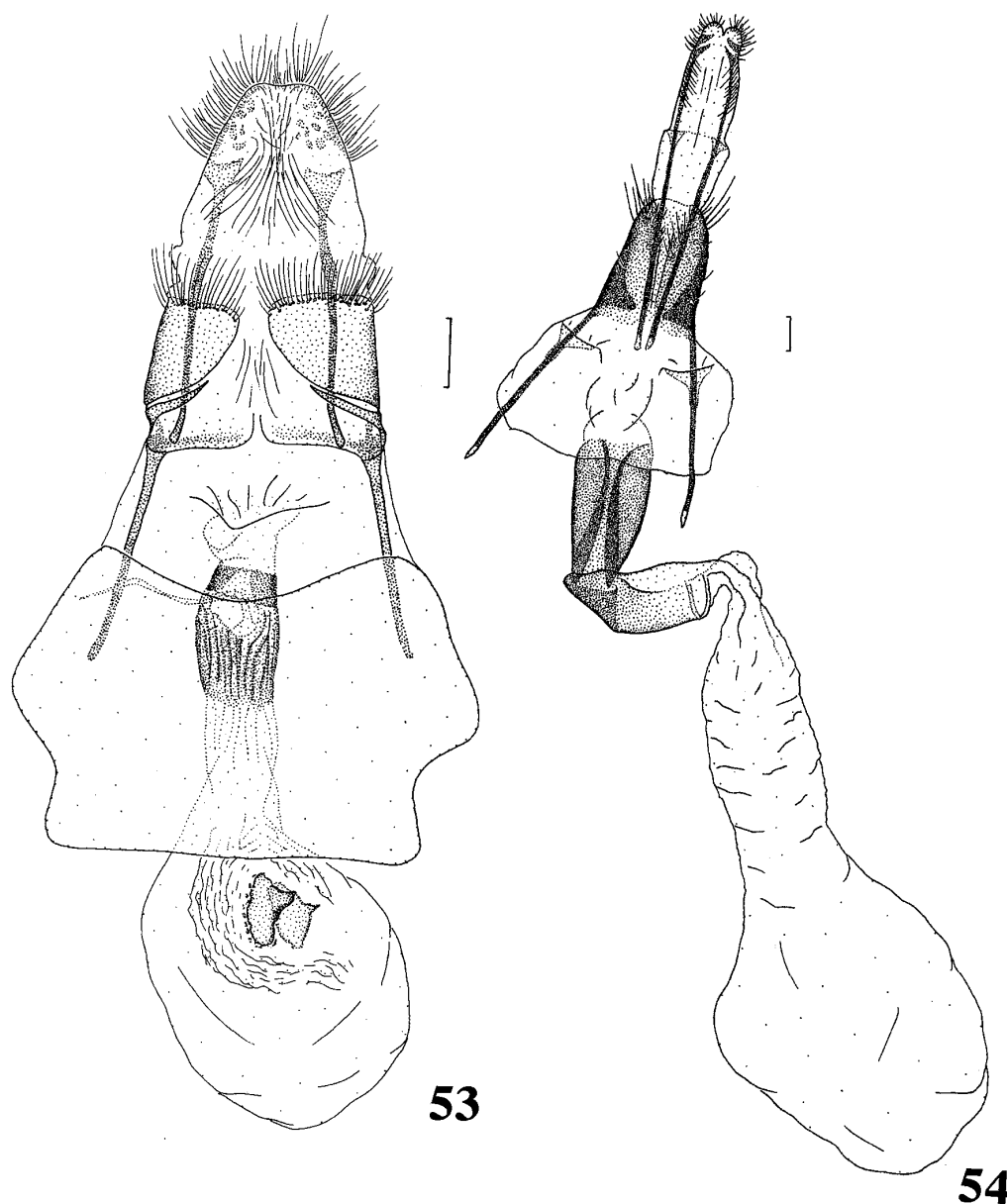
Figs 51–52. Female genitalia. Scale bars: 0.5 mm. 51. *Paradoxecia karubei* sp. nov. (paratype, gen. prep. AK186) (ZMUN). 52. *P. dizona* (Hampson, 1919), comb. nov. (gen. prep. AK189) (CAK).

montane tropical rainforest.

Distribution. Known only from the type locality.

Material examined. Holotype ♂, N. Vietnam, Vinh Phu Prov., Tam Dao, 930 m, 4. V. 1996, Y. Arita leg. (ZMUN).

Etymology. This highly interesting species, which is the first representative of a new genus of Pennisetiini, is dedicated to our friend Prof. Clas Naumann (Bonn, Germany), who has made fundamental contributions to the phylogenetic systematics of the Sesiidae.



Figs 53–54. Female genitalia. Scale bars: 0.5 mm. 53. *Paradoxecia tristis* sp. nov. (paratype, gen. prep. AK142) (ZMUN). 54. *Rectala magnifica* sp. nov. (paratype, gen. prep. AK242) (ZMUN).

Tribe Similipepsini Spatenka *et al.*, 1993

Similipepsis Le Cerf

Similipepsis Le Cerf, 1911: 303. Type species: *Similipepsis violaceus* Le Cerf, 1911, by monotypy. Hampson, 1919: 51 (key), 114; Dalla Torre & Strand, 1925: 180; Gaede, 1929: 535; Naumann, 1971: 25; Heppner & Duckworth, 1981: 44; Fletcher & Nye, 1982: 150; Wang, 1984: 85–87; Gorbunov & Arita, 1995d: 379–380.

Vespaegeria Strand, 1913: 70–71. Type species: *Vespaegeria typica* Strand, 1913, by original designation. Hampson, 1919: 114 (as synonym of *Similipepsis* Le Cerf, 1911); Dalla Torre & Strand, 1925: 180 (as distinct genus); Gaede, 1929: 535 (as synonym of *Similipepsis*); Naumann, 1971: 29 (as distinct genus); Heppner & Duckworth, 1981: 44 (as synonym of *Similipepsis*); Fletcher & Nye, 1982: 168;

Spatenka *et al.*, 1993: 86 (as synonym of *Similipepsis*); Gorbunov & Arita, 1995d: 379 (as synonym of *Similipepsis*).

***Similipepsis helicellus* sp. nov.** (Figs 29, 30, 44)

Description. Holotype ♂ (Fig. 29). Alar expanse 15.0 mm, forewing length 6.5 mm, body length 8.0 mm, antenna 3.5 mm.

Head: antenna filiform, scaled, in two rows ciliate, apical 12–13 segments without cilia; labial palps long upcurved, black, white interiorly, ventrally mixed with white; basal joint long, rough-scaled; frons, vertex and pericephalic scales black. **Thorax:** black, prothorax with yellow spot ventro-laterally; patagia black, with yellow posterior margin; tegulae black with yellow spot at forewing base. **Legs:** neck plate yellow; fore coxa black, basally and distally yellow; fore femur black, distally yellow; tarsus black, yellow mixed ventrally; mid and hind legs black, coxae strongly mixed with yellow, femora with yellow anterior margin, tibiae in basal part yellow interiorly, tarsomers with few yellow scales. **Abdomen:** segment 1–2 forming a narrow waist; tergites black; tergites 2 and 5 with a yellow posterior margin; tergite 3 with some yellow scales at posterior margin; sternites 1+2 dirty yellow-white with a yellow posterior margin; sternite 5 with yellow posterior margin; anal tuft black. **Forewing:** transparent areas well developed; veins black; discal spot narrow, black; ETA consisting of 4 cells; apical area narrow but strongly broadened to costal margin. **Hindwing:** transparent; veins black; outer margin narrow, black.

Male Genitalia (gen. prep. No AK182, Fig. 44). Uncus small, apically pointed, bilobed and sparsely covered with short setae ventrally; tegumen very strong and broad, fused to uncus; with two rounded wing-shaped hooks at the lateral margins (gnathos?); valva strongly narrowed in middle part, spoon-shaped apically, ventral part of sacculus with numerous strong, short, blunt ending spines; vinculum small; saccus long and strong, apically rounded; aedaeagus about twice as long as valva, apically bent, pointed, with numerous minute spines at the very tip; subbasally with a strong helicoidal projection (specialized coecum penis?).

Variation. Little variable in size and extension of the yellow rings of the abdomen, some specimens with deep orange-yellow instead of yellow markings.

Diagnosis. According to the male genitalia the new species is very unusual among the known *Similipepsini*. The helicoidal proximal projection (coecum penis?) of the aedaeagus and the massive structure of the tegumen is unique among the known species of the tribe. By external characters, the new species somewhat resembles *Milisipepsis lasiocera* (Hampson, 1919), which is, however, somewhat larger (alar expanse *ca* 18 mm) and has a different maculation of the abdomen (tergite 2 with a white band, sternites 1+2 white).

Habitat and bionomics. The type specimens were collected in late April and early June at the edge of lowland tropical rainforest. They were attracted to excrement of horses at noon.

Distribution. At present only known from the type locality.

Material examined. Holotype ♂, N. Vietnam, Ninh Binh Prov., Gia Vien, Cuc Phuong, 250 m, 6. VI. 1997, Y. Arita leg. (ZMUN). Paratypes. 4 ♂, same data, 5–6. VI. 1997, Y. Okushima leg. (ZMUN); 3 ♂, same data, B. Tanaka leg. (ZMUN); 2 ♂, same data, M. Takahashi leg. (ZMUN); 1 ♂ same data, R. Matsumoto leg. (ZMUN); 4 ♂, same data, Y. Arita leg. (ZMUN); 4 ♂, same data, 370 m, 25–28. IV. 1998, Y. Arita leg. (ZMUN); 1 ♂, same data, 24. IV. 1998, R. Matsumoto leg. (ZMUN); 4 ♂, same data, 250 m, 24–25. IV. 1998,

H. Riefenstahl & B. Wagenblass leg. (CHR).

Remarks. Concerning the venation (R_1 arising from about 2/3 of R-stem), the shape of the antennal apical segments (apical 12 segments without pectination) and the shape of the ventral processus of the tegumen (rounded) the species can not be included in *Milisipepsis*. For this, we here include the species into the genus *Similipepsis*. Examining the generic characters mentioned by Gorbunov & Arita (1995d) to erect *Milisipepsis*, it appears that these are highly variable among the representative of Similipepsini of both the Ethiopian and the Oriental regions and probably not suitable to support a generic separation from *Similipepsis*. But, the structure of the tribe must be confirmed on the base of the examination of a higher number of species both from the Oriental and the Ethiopian regions.

***Milisipepsis* Gorbunov & Arita**

Milisipepsis Gorbunov & Arita, 1995d: 382–383. Type species: *Similipepsis takizawai* Arita & Spatenka, 1989, by original designation. Spatenka *et al.*, 1999: 62.

***Milisipepsis bicingulatus* (Gorbunov & Arita)**

Similipepsis bicingulatus Gorbunov & Arita, 1995c: 71–74, figs 2, 12. Type locality: Vietnam, Sam Con a Vang Lom. Holotype ♂, MHNG.

Milisipepsis bicingulatus: Gorbunov & Arita, 1995d: 383.

The species is known only from the holotype specimen.

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摘 要

ベトナムのヒメスカシバガ亜科 (鱗翅目, スカシバガ科) (Axel Kallies・有田 豊)

ここ 10 年くらいの間にベトナムの鱗翅目相がかなり解明されてきた。スカシバガ科も多数の昆虫研究者の協力によってかなりの資料が得られるようになった。著者らも 1996 年よりベトナムでの調査を開始し、1997 年よりスカシバガ科の合成性フェロモンを使用することにより多数の種類と多くの個体を収集することができた。

近年のベトナムのスカシバガ科の報告は、Romieux によって 1950 年に採集され、主にスイスのジュネーブ博物館に保存されている資料によってなされている (Gorbunov, 1988; Gorbunov & Arita, 1995a, 1995b, 1995c, 1996, 1997)。また、著者らの資料による報告もなされつつある (Arita & Gorbunov, 2000a, 2000b, 2000c; Gorbunov & Arita, 2000a; Arita & Kallies, 2000)。

本報告では、スカシバガ科、ヒメスカシバガ亜科に所属する 21 種類を報告した。ヒメスカシバガ亜科を調べた結果、他の鱗翅目と同様に、北ベトナムのファウナは北東インドや南中国と関係が深いことが明らかになった。すなわち、*Trichocerota dizona* Hampson, 1919, *T. radians* Hampson, 1919 および *T. proxima* Le Cerf, 1916 などは北東インドから知られており、今回北ベトナムからも記録された。さらに、*Caudicornia tonkinensis* sp. nov., *Entrichella pogonias* Bryk, 1947 および *Trichocerota melli* sp. nov. などは南中国からも記録された。

Subfamily Tinithiinae Le Cerf, 1917

Tinthiini Le Cerf, 1917*Ceratocorema* Hampson, 1893, gen. rev.= *Neotinthia* Hampson, 1919, syn. nov.*C. hyalina* sp. nov. (Figs 2, 31, 45)

非常に小さいスカシバガでこの属の他の種類はインド、ミャンマー、ラオス、マレーシアなどから知られている。

C. yoshiyasui sp. nov. (Figs 3, 46)

前種同様に小さい種で北ベトナムのクックホンで得られた。

Parathrenopsis Le Cerf, 1911= *Oligophlebiella* Strand, 1916, syn. nov.*P. flaviventris* sp. nov. (Figs 4, 47)

この属の種類は、東アジアと東南アジアから 5 種類が知られているのみである。

Caudicornia Bryk, 1947*C. xanthopimpla* Bryk, 1947 (Figs 5, 32)

この種類は北部ミャンマーから知られていたが、今回北ベトナムの最高峰のファンシーパン山の近くのサバ (標高 1,950 m のところ) で合成性フェロモンによって採集された。

C. tonkinensis sp. nov. (Figs 6, 7, 33, 48)

図示したように際だった性的二型の種類である。幼虫はキイチゴの一種の前年茎の基部近くに潜っているのが発見され、飼育の結果本種の雌が羽化した。雄は午後に合成性フェロモンに飛来した。本種は南中国からも発見された。

Entrichella Bryk, 1947*E. pogonias* Bryk, 1947 (Figs 8, 9, 10, 34)

本種は、中国の *E. leiaeformis* (Walker, 1865) や同じく中国の *E. meilinensis* (Xu & Liu, 1993) や韓国の *E. shakojianus* (Matsumura, 1931) などに酷似している。再調査が必要である。

E. tricolor sp. nov. (Figs 11, 12, 34, 49)

この種は腹部第 4 と 5 節の橙黄色と白の帯によってこの属の他の種類と容易に区別される。南中国からも記録された。

Trichocerota Hampson, 1893*T. proxima* Le Cerf, 1916, comb. rev. (Figs 13, 36)

本種は腹部基半分が黒褐色で残りの半分が灰色がかった黄色の 2 色で、他の種類とは際だって異なる。北部ミャンマーから知られていたが、北部ベトナムからも記録された。

T. radians Hampson, 1919 (Figs 14, 15)

本種も前翅の長い透明部分から他の種と容易に区別される。北東インドから知られていたが、北部ベトナムからも記録された。

T. spilogastra (Le Cerf, 1916), comb. rev.

本種はすでに、Gorbunov & Arita (1995c) によってベトナムより記録された。

T. melli sp. nov. (Figs 16, 17, 37, 50)

本種の前翅の青い輝きはこの属の種としては非常に特徴的である。中国南東部と北ベトナムから記録

された。

Paradoxecia Hampson, 1919

= *Paranthrenina* Bryk, 1947, syn. nov.

P. myrmekomorpha (Bryk, 1947), comb. nov. (Figs 18, 19, 38)

本種は腹部基半分が黒褐色で、外半分が灰黄色である。北部ミャンマーから知られていたが、今回北ベトナムからも発見された。

P. vietnamica Gorbunov & Arita, 1997

本種は、Gorbunov & Arita (1997) によって記載された 1 雌が知られているのみである。

P. luteocincta sp. nov. (Fig. 20)

本種は腹部の幅広い 2 本の帯が特徴的である。

P. karubei sp. nov. (Figs 21, 51)

本種は腹部の幅広い橙黄色の帯が特徴的である。

P. dizona (Hampson, 1919), comb. nov. (Figs 22, 23, 39, 52)

本種は北東インドから知られていたが、今回北ベトナムから発見された。

P. tristis sp. nov. (Figs 24, 25, 40, 53)

本種は腹部に帯が全く現われないことからこの属の他の種類から区別される。

Rectala Bryk, 1947

R. magnifica sp. nov. (Figs 26, 27, 41, 54)

本種は雌雄ともに腹部に幅広い黄色の帯が存在することにより他種と間違えることはない。

Pennisetiini Naumann, 1971

Corematosetia gen. nov.

翅脈はヒメスカシバガ亜科の *Pennisetia* 属に似るが、雄の触角が *Pennisetia* 属では bipectinate (両櫛歯状) であるのに対して本属では単毛である。また雄のゲニタリアではバルバが大変異なる。

C. naumanni sp. nov. (Figs 28, 42, 43)

北ベトナムのタムダオで 1 雄が得られているのみである。

Similipepsini Spatenka *et al.*, 1993

Similipepsis Le Cerf, 1911

= *Vespaegeria* Strand, 1913

S. helicellus sp. nov. (Figs 29, 30, 44)

本種は開張 15 mm と大変小さく、また腹部が強くくびれており、チビドロバチに非常によく擬態している。

Milisipepsis Gorbunov & Arita, 1995

M. bicingulata (Gorbunov & Arita, 1995)

本種は、Gorbunov & Arita (1995c) によって記載されたホロタイプのみが知られている。

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